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COMMUNICATIONS

ON THE VALUE OF ORTHOPTIC TRAINING

BY

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LONDON

OF recent years very considerable attention has been paid to the question of improving the results of the treatment of squint by supplementing the simple clinical methods with organised training on special instruments. The general enthusiasm, the organisation, and the publicity is new; the underlying principles are, for the most part, far from new. It is in the writer's opinion—and from conversation he has gathered that this opinion is shared by many—high time that an impartial investigation were conducted in order to discover whether the immense amount of time and trouble now being devoted to orthoptics is bearing the fruits of success which one is entitled to expect from so highly organised and extensively practised a branch of ophthalmology.

There are special reasons why orthoptics should be so scrutinised as to results. The recent interest in this branch of ophthalmology has resulted in large numbers of medically unqualified persons undergoing a course of study, subsequently to undertake the training of squinting children, which training is usually of a very protracted nature. Aided by the somewhat apathetic acquiescence of the majority of ophthalmic surgeons, the practice of orthoptics,

from some points of view, has reached the position of a vested interest, and its uncritical acceptance is all that is needed to ensure its persistence, quite apart from its excellence. It cannot, I think, be said that the same holds true for, say, massage, or physico-therapy—two ancillary services which bear, to their parent sciences, relationships similar to that borne by orthoptics to ophthalmology.

Opinions are obviously divided upon the value of orthoptic training. From enthusiasts the impression is gained that light has at last dawned upon the treatment of squint; on the other hand the opinion has lately been expressed that most of the time spent in training is useless and some positively harmful. There seems little doubt that this discrepancy arises from the fact that there is no general agreement as to what is aimed at in the treatment of squint. A cosmetically straight eye is justifiably considered essential before one can speak of a cure in any sense—this is fundamental and agreed; it is upon the painful and prolonged striving after stereoscopic vision that disagreement arises. It is in the writer's opinion quite unnecessary to set such a high standard as the possession of full stereoscopic vision; very few people need it and fewer still are aware of the possession of it. Let it be assumed as a postulate in the present instance that the aim of the treatment of squint is to give two straight seeing eyes—a considerable assumption in view of the present orthoptic activities but one with which it is my experience that most ophthalmic surgeons will agree. It is the common experience that, for this end to be achieved, some degree of fusion is essential in order to endeavour to ensure that deviation shall not occur again; this point will be mentioned later.

This standard will be assumed in the argument of this article and the conclusions arrived at will be drawn with that as a basis. It has to be admitted at once that only one—though the largest—branch of orthoptics will here be considered, *viz.*, that concerned with the treatment of squint in young children. The treatment of adults, both for squint and heterophoria, will not be touched upon in detail, though it may be mentioned in passing that the results in such cases seem to be very disappointing.

For an attempt to assess the value of orthoptic training, and to estimate any improvement in results consequent upon the introduction of an orthoptic department into an ophthalmic out-patient department, the opportunity presented at Paddington Green Children's Hospital seemed too good to be allowed to pass. There the writer has been in charge of the ophthalmic department, devoted of course exclusively to children, since 1929; before him Mr. Maurice Whiting held the post, and many cases referred to here were in his charge first. The treatment of the squinting

children as applied by myself and my predecessor differed in no important particular, and may be described as consisting of:

(*a*) Full correction of any refractive error (with rare exceptions).

(*b*) Occlusion for suppression, or amblyopia.

(*c*) Operation where deemed necessary.

There were thus present a large number of cases of squint available, treated by such methods only, for comparison.

In 1935 an orthoptic department was instituted, presided over by a medically unqualified certified orthoptist. Ever since then every single case of deviation has been referred to the department for examination and comment; moreover all old cases of recognised squint, whether apparently cured or not, were also referred to the Department, and a record kept. It is thus seen that the results of treatment with and without the help of an orthoptic department can be accurately compared. The age limit for attendance at the Hospital is twelve in the case of boys and fourteen in the case of girls; this rule is somewhat elastic in such departments as the ophthalmic, where no inconvenience is caused by the attendance of children a little older.

It is with apology that tables are introduced into these notes. At their best somewhat boring to peruse, and at their worst triumphantly indecipherable or meaningless, they usually mark the point where the reader gives up the effort and turns to the next article. It did seem, however, essential that some data should be presented in tabular form, so that the source of the deductions might be checked.

The first table simply gives an analysis of those cases which were available for consideration when it was decided to begin the investigation (Table I). The second, Table II, gives a detailed analysis of the cases appearing under heading AI in Table I; the third gives a similar analysis of cases which appear under heading AIII in Table I; and the fourth, Table IV, appears under the title "Results of Orthoptic Department" as the Orthoptic Assistant's estimate of the results achieved with the material available in the agreed time.

TABLE I

No. of cases seen, 124.

(*a*)	Old cases with glasses	86
(*b*)	New cases with glasses	33
(*c*)	Cases with no glasses	5

TABLE I—*continued*

A.I. Old cases, straight with glasses and needing no Orthoptic Treatment, 27.

(*a*) Good stereopsis	7
(*b*) Partial stereopsis	14
(*c*) Good fusion	6

A.II. Old cases, straight with glasses but needing some Orthoptic Treatment, 8.

Amblyopia	4
No fusion	2
Weak fusion (headache)	1
No binocular vision	1

A.III. Old cases, not straight with glasses, having worn glasses at least six months, 51.

Amblyopia (all convergent)	18
Occasional (convergent 3, alternating convergent 1)	4

Constant.

(*a*) *Normal retinal correspondence*, 15.
(convergent 10, alternating convergent 3, divergent 1, alternating divergent 1)

(*b*) *Abnormal retinal correspondence*, 14.
(convergent 9, alternating convergent 3, divergent 2)

B. New cases with glasses which have never been worn before or have been worn less than six months, 33.

Amblyopia	10
Too young	4
Observation	19

C. Cases with no refractive error, 5.

Occasional squints	3
Exophoria	1
Divergent squint	1

TABLE II

Cases cured with glasses

Serial No.	Age at first visit	Age at Onset	Nature of Squint	Worn	Angle on Synop. c. gls.	Angle on Synop. s. gls.	Worth Lights c. gls.	Worth Lights s. gls.	Binoc. Vision
12/35	7	Birth	RCCS	3 yrs.	0°	0°	4	4	S.V.
18/35	6	5 yrs.	RCCS	1 yr.	0°	+5°	4	5	Partial S.V.
21/35	15	? 5 yrs.	LCCS	11½ yrs.	0°	+5°	4	5	S.V.
22/35	10	?	LCCS	—	0°	0°	4	4	Partial S.V.
26/35	4½	3 yrs.	LCCS	1½ yrs.	0°	+3°	4	4	S.V.
27/35	7	6 yrs.	LCCS	6 mths.	0°	+5°	4	4	S.V.
32/35	8	?	ACCS	7 yrs.	0°	—	4	4–5	Partial S.V.
37/35	4	Birth	RDCS	3 yrs.	0°	0°		—	Good fusion
40/35	11	5-6 yrs.	RCCS	6 yrs.	0°	0°	4	4	Partial S.V.
43/35	5	4 yrs.	LCCS	1 yr.	0°	+7°	4	5	Partial S.V.
49/35	12	12 yrs.	RCCS	4 mths.	6°	—	4	5	Partial S.V.
53/35	6	9 mths.	LCCS	5 yrs. 3 mths.	0°	0°	4	4	Good fusion
56/35	12	2 yrs.	LCCS	8 yrs.	0°	+5°	4	4–5	Partial S.V.
57/35	6	9 mths.	LCCS	9 mths.	0°	+4°		?	Partial S.V.
64/36	8	9 mths.	LDCS	2½ yrs.	0°	0°		?	Partial S.V.
65/36	9¾	3 yrs.	RCCS	—	0°	0°		?	Good fusion
68/36	2	Birth	LCCS	6 mths.	+2°	—		?	Too young
73/36	8	? 2 yrs.	LCCS	1 yr.	0°	+6°		?	S.V.
89/36	7	7 yrs.	LCCS	5 mths.	0°	0°		?	S V.
99/36	4½	12 mths.	RCCS	3 yrs.	0°	+5°		?	Good fusion
92/36	10	Birth	RCCS	7½ yrs.	0°	+4°		?	S.V.
103/36	8	5½ yrs.	RCCS	2 yrs.	0°	+6°		?	Good fusion
105/36	7	1½ yrs.	RCCS	6½ yrs.	0°	0°		?	Partial S.V.
121/36	5	3 yrs.	ACCS	2 yrs.	0°	0°		?	Partial S.V.
87/36	7	2 yrs.	RCCS	2 yrs.	0°	+6°		?	Partial S.V.
94/36	5	4 yrs.	RCCS	14 mths.	0°	—		?	Partial S.V.
123/36	8	3 yrs.	LCCS	5 yrs.	0°	0°		?	Partial S.V.

TABLE III

Cases not straight with glasses, when first seen

Amblyopias

Serial No.	Age at first Visit	Nature of Squint	Degree of Amblyopia	Age at Onset	Worn	Binocular Vision
19/35	4	LCCS	6/18	16 mths.	2½ yrs.	Suppression
9/35	12	RCCS	6/36	3 yrs. ?	9 yrs.	Suppression
66/36	3½	RCCS	6/36	3 yrs.	9 mths.	Suppression
116/36	6	RCCS	6/18	3 yrs.	2½ yrs.	Suppression
36/35	11	LCCS	6/60	14 mths.	7 yrs.	Suppression
39/35	4	RCCS	6/18	2½ yrs.	18 mths.	Suppression
62/35	5½	RCCS	6/60	3 yrs.	2 yrs.	Suppression
63/35	9	RCCS	6/36	5 yrs.	4 yrs.	Suppression
67/36	4½	LCCS	6/18	2 yrs.	4 yrs.	Suppression
48/35	10	LCCS	6/60	3 yrs.	6 yrs.	Suppression
69/36	7½	RCCS	6/24	2 yrs.	4½ yrs.	Suppression
10/35	3	LCCS	6/18	2 yrs.	1 yr.	Suppression
106/36	15	RCCS	6/18	2 7/12 yrs.	12½ yrs.	Suppression
118/36	8	RCCS	6/60	4 yrs.	1 yr.	Suppression
38/36	8	RCCS	6/36	2½ yrs.	4½ yrs.	Suppression
4/35	9	LCCS	6/36	2½ yrs.	6½ yrs.	Suppression
34/35	9	RCCS	6/36 Nystagmus	2 yrs.	7 yrs.	Suppression
71/36	2¾	LCCS	6/18	2 yrs.	10 mths.	Suppression

TABLE III—*continued*

Normal retinal correspondence

Serial No.	Age at first Visit	Nature of Squint	Degree of Amblyopia	Age at Onset	Worn	Binocular Vision
5/35	5	ADCS	—	3 yrs.	2 yrs.	Fusion −5° *
1/35	6	LDCS	—	2-3 yrs.	18 mths.	Fusion −8°
17/35	8	LCCS	—	4 yrs.	4 yrs.	Fusion +10°
84/36	11	ACCS	—	Birth?	9 yrs.	No fusion +10°
20/35	13	ACCS	—	7 yrs.	6 yrs	No fusion +20°
88/36	6	RCCS	—	3½ yrs.	3 yrs.	Fusion +10° L/R
16/35	9½	RCCS	—	4 yrs.	4½ yrs.	Fusion +10°
61/35	10½	LCCS	—	2½ yrs.	8 yrs.	No fusion +15°
31/35	4½	LCCS	—	Birth	4 yrs.	No fusion +5°
74/36	9	RCCS	—	10 mths.	8 yrs.	Fusion +12°
11/35	3	LCCS	—	2 yrs.	1 yr.	Fusion +10°
60/35	8½	RCCS	—	2 yrs.	6½ yrs.	No fusion +15°
6/35	7	LCCS	—	6 mths.	6 yrs.	No fusion +15°
72/36	3	LCCS	—	2 yrs.	1 yr.	No fusion +10°
70/36	3	ACCS	—	18 mths.	14 mths.	No fusion +20° L/R 8°

* Measured, with glasses, at first visit. Where fusion is present, the angle at which fusion occurs is given. Where no fusion is present, the angle of squint is given.

Abnormal retinal correspondence

Serial No	Age at first Visit	Nature of Squint	Degree of Amblyopia	Age at Onset	Worn	Angle of Squint with glasses
13/35	7	ACCS	—	2½ yrs.	4½ yrs.	+20°
15/35	4	LCCS	—	1 yr.	4 yrs.	+30°... +40°
45/35	5	RCCS	—	9 mths	3 yrs.	+15°
114/36	10	RCCS	6/36	3 yrs.	7 yrs.	Suppression +10°
91/36	9	LCCS	—	4 yrs.	6 yrs.	+25°
119/36	6	ACCS	—	9 mths.	4 yrs.	+30°... +40°
3/35	9½	LCCS	—	2¾ yrs.	5 yrs.	+40°
120/36	4½	LDCS	—	Birth?	2½ yrs.	−15°
28/35	6	ACCS	6/12	Birth?	18 mths.	+12°
59/35	2	ADCS	—	17 mths.	6 mths	−15°
125/36	14	RCCS	—	Birth	9 yrs.	+10°
7/35	5	RCCS	6/12	Birth	3 yrs.	+15°
90/36	11½	LCCS	—	2 yrs.	10 yrs.	+5°
33/35	6	LCCS	6/12	3 yrs.	3 yrs.	+7°

TABLE IV

Results of Orthoptic Department, March, 1937.

A.I. All these cases that it has been possible to keep under observation have remained steady or improved.

A.II. *Amblyopias.*

6/36, now discharged with good stereopsis.
6/36, now 6/9, partial stereopsis.
6/18, now 6/12, still having treatment.
6/24, has not since attended.

No fusion.

Discharged with stereopsis	...	1
Fusion		1
Refused as unsuitable		1
Will not attend		1

A.III. *Amblyopias.*

Discharged with stereopsis	6	(1 operation case)
Good fusion, partial stereopsis, synoptophore angle with glasses $+5^{\circ}$ or less	5	
Fusion, still having treatment ...	2	
Simultaneous perception, still having treatment	3	
Failure. 6/36 after five months ..	1	
Unsuitable. Nystagmus	1	

Occasional.

Discharged with stereopsis ...	4	

Constant (*a*) Normal retinal correspondence.

Discharged with stereopsis ...	9	
(0° on Synoptophore $\bar{c}$ glasses, and 4 Worth lights)		
Fusion, less than $+10^{\circ}$ with glasses	2	
Too young at present	2	
Unable to attend	2	

A.III. (*b*) *Abnormal retinal correspondence.*

Discharged with stereopsis ...	3	(2 operation cases)
Partial stereopsis, angle less than $+3^{\circ}$ with glasses	3	(1 operation case)
Treatment just started	3	+1 on fusion
Failure	1	
Too young	1	
Unable to attend	2	

TABLE IV—*continued*

B. *Amblyopias.*

Discharged with stereopsis ...	2
Less than +5°, good fusion, partial stereopsis	3
Fusion, still on treatment	1
Vision improving	3
Unable to attend	1
Too young	4
Observation.	
Improved on each visit, no treatment at present	7
Given treatment after observation	7
Discharged S.V.	1
Good fusion, less than +5° c̄ gl.	6
Will not attend	5

C. *Cases with no glasses.*

Exophoria, needed no treatment ...	1
Occasional squints, needing no treatment	2
Divergent squint, too young ...	1
Occasional squint, discharged, with stereopsis	1

In assessing the results, thirty-three cases were at once eliminated as having been under observation for too short a time to justify their inclusion. Of the five cases for which no glasses were ordered, three appeared to have undergone spontaneous cure, one was cured by treatment and one was too young to be included. There remained eighty-six cases; the interesting fact emerges that of these twenty-seven were straight and possessed at least some degree of fusion, which together with the three mentioned above gives a total of thirty cases cured without orthoptic aid—just a third of the whole.

Fifty-nine cases are left, and of these eight were found to be straight but still in need of some treatment, while fifty-one were not straight. Three of the eight responded to orthoptic treatment and are classified as cures; the fifty-one are divided into amblyopias, occasional squinters, and constant squinters, in the proportion of 18 : 4 : 29. Six of the first category were cured by orthoptic treatment, one of these needing operation as well; all the four in the next class are described as being "discharged with stereoscopic vision," but whether they are to be classed as orthoptic cures is another matter. Unfortunately I cannot trace the individual records in order to see to how much treatment each

was submitted, but it would seem reasonable to doubt, considering that their squinting was only occasional, whether any treatment at all was needed, in which event they would fall into the category of " cured by glasses." It seemed fairer to omit them altogether in assessing the final results.

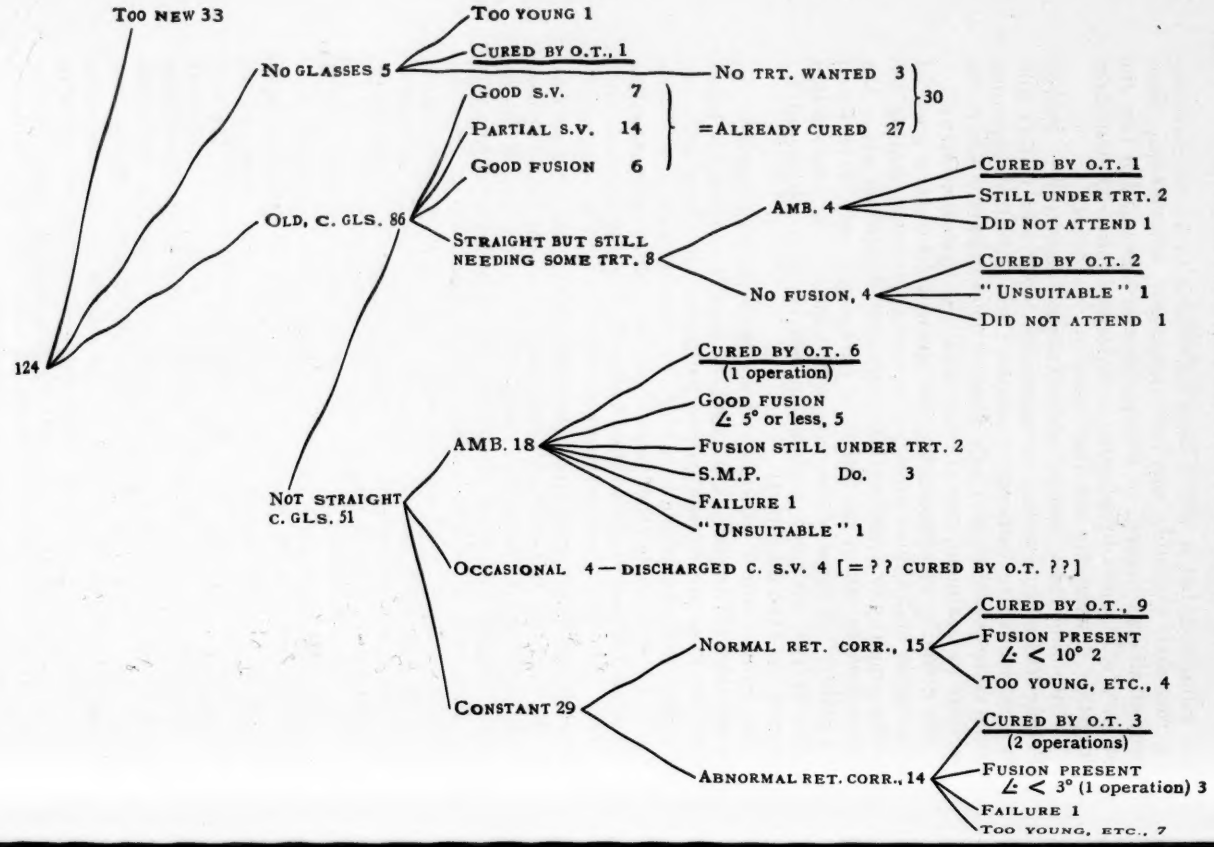
Twenty-nine cases remain, still constantly squinting. Fifteen of these had normal retinal correspondence and nine of this subclass responded to orthoptic treatment; fourteen had abnormal retinal correspondence and only three of these showed a successful response to treatment, two of them requiring operation as well.

The difficulty of appreciating the meaning of such a mass of information and figures provides the excuse for representing the results graphically; this has been done in Table V, where the information set out in the last three paragraphs may be reviewed at a glance. If some of the categories appear to be labelled in a rather cryptic manner, explanation will at once be found by referring to Tables I and II.

The term " cure " obviously demands some explanation. In the opinion of its parents a child is usually considered cured when the eyes are straight, more particularly if the glasses are also discarded; and while in a large number of cases such a state of affairs is certainly all the " cure " which is likely to be required, a somewhat higher standard must be set in a critical analysis such as this. All ophthalmic surgeons are familiar with the case which shows no deviation, even upon the instrument, and yet possesses no useful degree of fusion; all are equally familiar with the case which possesses stereoscopic vision when discharged from the department, only to show that such a faculty has been lost at a later date, with or without a return of deviation. It is therefore manifestly impossible to use the term " cure " in a strict sense; the term has been quoted from the records of the Orthoptic Department, and presumably means that the patient on discharge (or examination if no treatment were found necessary) showed no deviation and possessed a high degree of fusion at least. Since it is seen that cases even with good stereopsis may relapse, it is suggested that to aim at such a condition is to aim too high, and that in the majority of cases straight eyes with some degree of fusion may be regarded as no longer in need of treatment.

It remains to consider the actual results. The most important fact—though it may not be new—which emerges from a consideration of the figures is that one-third of ninety-one totally unselected cases of squint in young children achieved what is deemed a cure by orthoptic standards without the assistance of any measures except glasses and occlusion where necessary. Further orthoptic training succeeded in curing less than a half of cases, which, though straightened by these measures, were considered to be in need of training in the orthoptic department.

TABLE V


124
TOO NEW 33
NO GLASSES 5
TOO YOUNG 1
CURED BY O.T., 1
NO TRT. WANTED 3
OLD, C. GLS. 86
GOOD S.V. 7
PARTIAL S.V. 14
GOOD FUSION 6
=ALREADY CURED 27
30
STRAIGHT BUT STILL NEEDING SOME TRT. 8
AMB. 4
CURED BY O.T. 1
STILL UNDER TRT. 2
DID NOT ATTEND 1
NO FUSION, 4
CURED BY O.T. 2
"UNSUITABLE" 1
DID NOT ATTEND 1
NOT STRAIGHT C. GLS. 51
AMB. 18
CURED BY O.T. 6 (1 operation)
GOOD FUSION ∠ 5° or less, 5
FUSION STILL UNDER TRT. 2
S.M.P. Do. 3
FAILURE 1
"UNSUITABLE" 1
OCCASIONAL 4 — DISCHARGED C. S.V. 4 [= ?? CURED BY O.T. ??]
CONSTANT 29
NORMAL RET. CORR., 15
CURED BY O.T., 9
FUSION PRESENT ∠ < 10° 2
TOO YOUNG, ETC., 4
ABNORMAL RET. CORR., 14
CURED BY O.T. 3 (2 operations)
FUSION PRESENT ∠ < 3° (1 operation) 3
FAILURE 1
TOO YOUNG, ETC., 7

As for those cases which ordinary clinical methods had, up to the time under consideration, failed to straighten, one must remember that it is justifiable to assume that some of these would have come straight as time went on, and also on the other hand, that some of those whom orthoptic training had so far failed to cure would have done likewise under this more intense treatment. None the less, viewing the figures as they stand, one-third of the amblyopic patients were cured, one with the help of operation, while more than half of those with normal retinal correspondence responded to treatment, though from the nature of their disability it may be said that the majority of them would have achieved similar success if given a longer period without training. It is in the group with abnormal retinal correspondence that the greatest disappointment is encountered, for only three of fourteen such cases were cured by orthoptic training.

These conclusions are broad, and, in so far as some do not take into account such a fact, for instance, as that a certain number of the cases had had very little treatment, or that some were too young, are to a certain degree manifestly unfair. Further, it might be said that one was comparing the results of some years of general ophthalmic measures with those of a much shorter time of orthoptic treatment. But it is in the belief that many children are asked to spend far too much time in the orthoptic department and in travelling to and from it—that, in fact, a serious social and economic question is involved—that the conclusions as set forth are considered justifiable. Furthermore, the time periods are by no means compatible, for one has to consider to what extent in a given period calls are made on the patient's time. Periodical refraction, supervision and occlusion demands a visit to Hospital for a few minutes, every two months or so at most; when a patient is accepted in an orthoptic department it is often a matter of attending twice or three times a week, and of spending a much longer time at each visit.

It is suggested that a consideration of the foregoing facts justifies the following conclusions :—

1. A far greater proportion of squints than is generally supposed can be cured by glasses, and occlusion where necessary.

2. Only those cases in which such measures have failed should be submitted to orthoptic training.

3. Cases should be considered and selected for training not only on their clinical merits but also with due consideration for the end it is desired to achieve and for the justification for the means necessary to attain it.

4. The results of orthoptic training are far less dramatic and far less certain than they are held to be in some quarters, and

the descriptions of the value of such training, which have appeared in the medical press, have all erred on the side of optimism.

I tender my grateful thanks to Miss Margaret Weight who was in charge of the Department at Paddington Green Children's Hospital in its first years, and kindly prepared the data for this article.

THE USE OF SODIUM AND MERCURY VAPOUR LAMPS IN OPHTHALMOSCOPY

BY

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THE writer has been employing sodium and mercury vapour lamps in clinical work during the past two years, and the advantages of these have been referred to in two communications (Ballantyne, 1937).

The inducement to experiment with these selected lights was provided by the demonstration of various forms of discharge lamps during the visit of Members of the Ophthalmological Society to the Research Department of the G.E.C. at Wembley in the Spring of 1936, and the first lamps used were the laboratory pattern sodium and mercury lamps. These were somewhat expensive, and, in the case of the mercury lamp at least, the luminosity was somewhat low for purposes of ophthalmoscopy.

Subsequently, the " Osira " mercury vapour lamp and the " Philco " sodium vapour lamp, as used for street lighting, were obtained, and these were found to give more than ample illumination.

For convenience in consulting room use, Messrs. Curry and Paxton have, at the writer's suggestion, fitted these two tubes on a single standard, but it would be equally easy to fit either or both of them to an adjustable wall bracket.

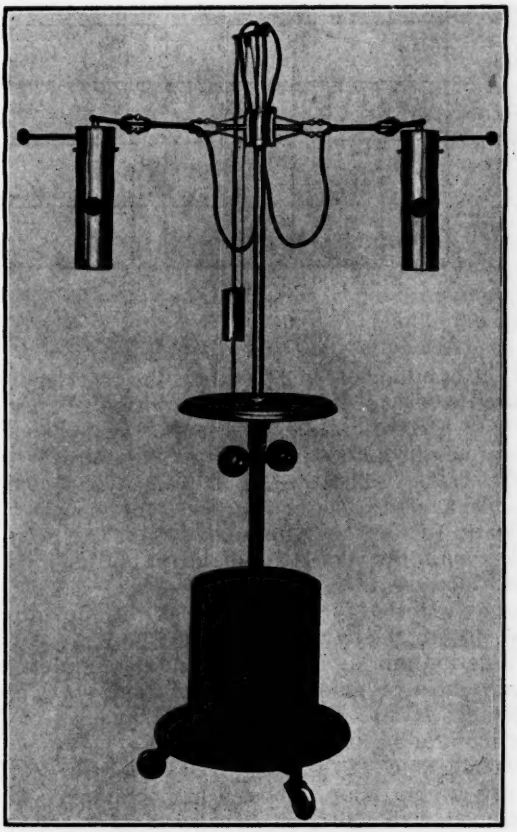
The electrical current is taken from the mains supply through a choke coil, and in the standard pattern referred to, the two coils are enclosed in a cabinet on the base. A small shelf or table-top is provided at a convenient height and the switches are attached below this on the upright standard. The lamps are attached to the ends of two jointed arms, adjustable for height, and as the luminous area of the discharge tubes is unnecessarily large for ophthalmoscopy, each is enclosed in a light asbestos-lined metal chimney with a suitable aperture, provided with a gallery in which

filters may be placed if desired. The reflecting ophthalmoscope is used, either by the direct or by the indirect method.

The lamps are of robust make and have a long life. Replacements cost, for the sodium lamp 32/6, and for the mercury lamp 35s.

For the information of those who are not familiar with the mercury vapour and sodium vapour lamps, I may state briefly their principal features and indicate some of their uses.

The Mercury Vapour Lamp is, of course, no novelty, and the appearance of the fundus oculi under its light has been described and illustrated by Mayou and, more recently, by Duke-Elder; but it has not come into general use. This, I fancy, is partly



due to the lack of a convenient form of lamp, of durable construction, and not too expensive. These obstacles have now been overcome by the introduction of the discharge lamps used in street and factory lighting.

As will be seen from Fig. 1, the radiation from this lamp includes a good deal of the spectrum, from the violet to the yellow-green; but the greater part of its light is from the blue-violet at 436 millimicrons, and the green at 546 millimicrons.

Since the predominant blue-green radiations are absorbed by the haemoglobin, while the yellow-greens are reflected by the sclera and to some extent by the retinal pigment, the most striking

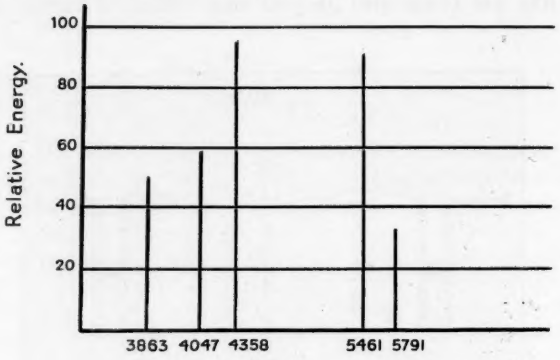


FIG. 1.

Emission spectrum of mercury vapour lamp.

feature of the ophthalmoscopic picture is the contrast of the chocolate coloured or purplish-black vessels with the greenish-yellow disc and grey-green fundus. The normal yellow spot shows up as an ill-defined brownish patch, about one-third of the area of the macula. The retinal nerve fibres can be traced as they radiate from the disc and arch above and below the macula. When, as in the blonde fundus, the choroidal vessels are seen against a light background, the vessels are darkened and their contrast with the ground increased.

The surface reflexes of the fundus, seen with the ordinary mixed light, are due to the reflection of the short wave components from the anterior limiting membrane, and the light of the mercury vapour lamp, being composed mainly of short waves, exaggerates these reflexes. It also gives to the axial reflexes of the vessels a more brilliant and glistening appearance.

The preponderance of the blue-green rays gives to the light of the mercury vapour lamp almost a monochromatic quality, and this, combined with the marked contrast of blood vessels and

background, renders visible the finest details of the retinal vessel system. Changes in the circumfoveal twigs, or the presence of fine pathological vessels on the disc and elsewhere, are easily discerned. For the same reason, haemorrhages stand out clearly against the fundus, and minute haemorrhages, which escape notice with the ordinary mixed light, are more readily discovered.

Superficial exudates, and retinal exudates in general, are clearly defined and take a greenish colour like that of the optic disc, but changes deep to the retina are not so clearly seen, since the retina is not so transparent to the short waves.

The exaggeration of the retinal surface reflexes may be useful in cases where they give an indication of changes in contour of the retinal surface, as in papilloedema, or oedema in the region of the macula, or where there are traction or pressure folds from various causes. On the other hand, these reflexes are sometimes disadvantageous, as they may conceal or confuse structural changes in a deeper plane.

The unfiltered light of the mercury vapour lamp is not equal to the Vogt red-free lamp for examination of the normal or pathological macula, but for most practical purposes it is a satisfactory substitute for the Vogt lamp, and it has the advantage that it is less disagreeable for the patient, and creates less dazzle for the examiner.

The Sodium Vapour Lamp provides us with a monochromatic light of pure yellow colour, and of high luminosity, well adapted for both direct and indirect ophthalmoscopic examination and for retinoscopy. Its value in the examination and photography of the external aspects of the eye has been emphasised by Kleefeld (1935-1936).

The two most important qualities of this light are, firstly, that it is almost purely monochromatic (Fig. 2) and, secondly, that it

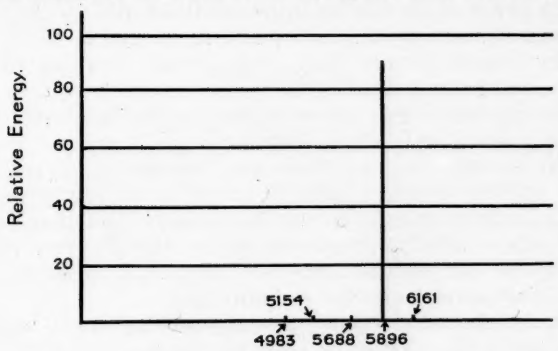


FIG. 2.

Emission spectrum of sodium vapour lamp.

is largely absorbed by the blood in the retinal vessels, so that there is a marked contrast between the dark brown colour of these, and the pale greyish-yellow of the fundus. These two properties give the light a notable resolving power, enabling us to follow the retinal vessels to their finest ramifications, and revealing changes in the vessels which might escape notice under the mixed light of the ordinary electric lamp.

In this respect, the light of the sodium vapour lamp resembles that of the mercury vapour lamp; in some cases indeed the latter is preferable, in that the darker tone of the vessels makes recognition of the finest twigs more easy. But whereas a considerable portion of the short wave mercury vapour light is reflected by the anterior limiting membrane and the pigment layer of the retina, the long wave light of the sodium vapour lamp suffers little if any reflection in this way. It is to some extent absorbed by the retinal and uveal pigment, but is largely reflected by the sclera.

Thus, not only does the sodium light not emphasise the surface reflexes of the retina, as does the mercury light; but, where such reflexes are produced by the mixed light of the electric lamp, the sodium light cancels them. The retina, and to a less extent, the choroid, is transparent to the rays, giving us a clearer view of changes in the choroid and the deeper layers of the retina. This can be demonstrated in the case of changes in the walls of the choroidal vessels, in the most minute form of colloid bodies, or other punctate lesions in the lamina vitrea or in the retina, and in sclerotic changes in the finest retinal vessels. The delicate white meshwork, probably gliosis, in the retina, in cases of branch thrombosis of the retinal veins, is more easily detected in the sodium light. It is probably the monochromatic quality of this light which enables us to trace the retinal nerve fibres almost as easily with its help as with the mercury vapour lamp. The fine resolving power of the sodium light was illustrated by the observation that a delicate cotton wool patch in the retina could still be traced by means of this light, after it had disappeared in the ordinary ophthalmoscopic light.

Where appreciation of colour values is essential to the ophthalmoscopic picture, as in the macular changes of myopia, including choroidal atrophy, pigmentation and haemorrhage, neither the sodium nor the mercury light is so useful as the mixed light. Pigment is more transparent to the sodium light than to mixed light, hence, retinal pigment patches or the pigment ring surrounding the disc assume a greyish colour. A melanoma of the choroid disappears under the sodium light.

When the choroidal vessel pattern is seen against a light background, as in the blonde or albinotic fundus, the sodium light enhances the visibility of the choroidal vessels by contrast with

their background, but in the tessellated brunette fundus, the vessel pattern disappears, owing to the approximately equal absorption of the light by the choroidal vessels and the intervening pigment.

The elimination of surface reflexes from the retina is one of the most interesting and valuable properties of the sodium vapour light. These reflexes may in any case conceal delicate changes in the retina, but this has been most frequently observed in cases presenting oedema of the disc, the surrounding retina or the macular area. In these circumstances, one often sees reflexes which are pathological in their number, extent or formation. When the sodium light is used, and the surface reflexes are eliminated, one is often able to see fine retinal exudates, such, for example, as minute specks arranged in clusters or radiating from the macula. In other cases it reveals retinal lines such as the double-contour lines of Vogt, which are obviously on a deeper plane than the surface reflexes, though the latter may have had the same linear arrangement.

Gunn's dots, which are easily seen in the ordinary ophthalmoscopic light, and are rendered still more striking by the mercury vapour light, disappear under the sodium vapour light. This seems to be clear evidence that, whatever may be the histological basis of the dots, they are very superficial and cause elevation of the anterior limiting membrane of the retina; but are as colourless and transparent as the tissues of the retina.

Each of these lights has a limited sphere of usefulness, but in the absence of differential staining of the living retina, they have an obvious value. Used in conjunction with, and as a supplement to the ordinary form of illumination, they are a very welcome addition to our resources in ophthalmoscopy, and it is a source of satisfaction that they are now available in a handy form for clinical work.

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HISTOLOGY OF BOWMAN'S MEMBRANE IN CASES OF GLAUCOMA

BY

GRAEME TALBOT

(FROM THE PATHOLOGICAL DEPARTMENT OF THE ROYAL WESTMINSTER OPHTHALMIC HOSPITAL)

IN the Proceedings of the Royal Society of Medicine for April, 1937, Eugene Wolff and T. K. Lyle described an eye excised for chronic glaucoma in which hemispherical bodies were seen in Bowman's membrane. Only one reference to this was found in the literature, but Wolff suggested that the condition might be found more often if carefully looked for.

Acting on this suggestion, these bodies have been carefully looked for in all eyes submitted to the Pathological Department of the Royal Westminster Ophthalmic Hospital. As a result of this investigation, I am of the opinion that they are to be found in every eye in which an increase of tension has existed for more than a few days, and in which the tension continues to be increased when the eye is excised. I did not see this appearance in an eye which did not have increased tension as judged by the clinical or pathological signs.

The appearance of these bodies is constant. A small hemisphere measuring about 10 μ. at the base is seen in Bowman's membrane, with its base applied to the corneal epithelium. Very often, corneal oedema is present, and then this hemispherical body tends to be opposite the space between the epithelial cells. Typically about sixty are seen in a section of the cornea, but sometimes only two or three typical bodies are present. They are best brought out by Verhoeff's stain or phospho-tungstic haematoxylin. However, they are seen plainly as pale pink bodies with haematoxylin and eosin, especially if the section is slightly over-stained. They are easy to see in a van Gieson preparation. In a section which has not been recently stained they tend to fade badly, but if one looks carefully, one can discover them even if they hardly stain at all. They have been found in both paraffin and celloidin sections. Lately we have been clearing the sections in pure cresote, and I fancy it has been easier to pick up these bodies since we adopted this technique.

On focusing carefully, one sometimes gets an impression that these bodies exceed a hemisphere, and that 2/3 of a globe can be seen. I had wondered if these bodies might be artefacts, possibly being the nuclei of the corneal epithelial cells in a deeper layer of the section, which appeared to have been depressed into Bowman's membrane. However, the possibility of their being

epithelial nuclei is disproved by Case 128, in which the epithelium has been extensively detached from the cornea, and lies curled up by itself, but typical bodies are seen in the denuded Bowman's membrane. Wolff pointed out that the number of bodies seen in a typical section roughly corresponds to the number of nerves which penetrate Bowman's membrane, and he suggested that they might be of a hyaline nature, in connection with these nerve

Section of cornea from a case of glaucoma showing bodies in Bowman's membrane (stained Verhoeff).

fibrils. These bodies seem to be structureless and I wonder if they may be lacuna-like spaces round the nerve fibrils. They would thus tend to lie opposite the spaces between the epithelial cells. We have not succeeded in staining these bodies for free or combined fat in frozen sections. The eyes from which the sections were cut were usually fixed with Zenker solution.

Thirty-two consecutive eyes submitted for pathological report have been studied for these bodies in Bowman's membrane. Fourteen cases, all presenting other evidence of glaucoma, have proved to have these bodies in Bowman's membrane. The bodies have been seen in no case presumed to have normal tension. However, in four cases with evidence of glaucoma, the bodies have not been discovered and these cases are described also.

Cases showing bodies in Bowman's membrane and with histological or clinical evidence of raised tension

Case No.	Pathological diagnosis of excised eye	Bodies in Bowman's membrane	Histological or clinical evidence of increased tension
61	Hypopyon ulcer of cornea with extensive corneal destruction	+	Considerable exudate in angle of anterior chamber. No other histological signs of increased tension. Clinically tension was raised.
65	Iridocyclitis with extensive anterior synechiae	Very faint +	Excised 14 days after cataract extraction, with raised tension. Disc and retina appear normal.
66	Melanotic sarcoma of choroid	+ + +	Ectropion uveae, disc not cupped, extensive destruction of retina.
67	Extensive melanotic sarcoma of choroid, with orbital extension	+ + +	Corneal oedema. Clinically tension was raised.
74	Thrombosis of central retinal vein and secondary glaucoma	+ + +	Disc not cupped. New formation of vessels on front of iris and optic nerve.
81	Thrombosis of central retinal vein and secondary glaucoma	+ +	Had existed six months before excision. Recurrent attacks of iridocyclitis. Disc not cupped.
83	Iridocyclitis following cataract extraction in opposite eye five months previously	+ but very faint	K.P. first seen in excised eye a month after operation on opposite eye. Disc not cupped, ganglion cells in retina showing some degeneration.
98	Iridocyclitis and secondary glaucoma. Cataract extraction two months before	+ faint	Clinically tension had been raised for two months. Disc cupped and degeneration of ganglion cells of retina.
109	Iridocyclitis and secondary glaucoma	+ very faint	Extensive anterior and posterior synechiae and k.p. Angle of anterior chamber much narrowed.
118	Thrombosis of central vein of retina and secondary glaucoma	+ + +	Anterior and posterior synechiae. Ectropion uveae and extensive degeneration of ganglion and nerve fibre layer of retina.
124	Melanotic sarcoma of choroid, which had grown round and compressed optic nerve	+ +	An acute attack of glaucoma preceded the excision.
127	Thrombosis of central vein of retina and secondary glaucoma	+ very faint	Anterior synechiae and new formation of vessels in iris. Corneal epithelium oedematous.

Case No.	Pathological diagnosis of excised eye	Bodies in Bowman's membrane	Histological or clinical evidence of increased tension
128	Thrombosis of central vein of retina and secondary glaucoma	+ +	Extensive anterior and posterior synechiae. New formation of vessels in iris. Deep cupping of disc, degeneration of ganglion cells of retina. In this case the corneal epithelium has become detached from the cornea but the bodies are seen as in all the other cases in Bowman's membrane.
137	Iridocyclitis with secondary glaucoma	+ +	Marked glaucomatous cupping of disc. Ectropion uveae, anterior synechiae, flattening of ciliary body and degeneration of ganglion cells of retina.

Cases not showing bodies in Bowman's membrane but in which histological or clinical evidence exists of increased tension

Case No.	Pathological diagnosis of excised eye	Bodies in Bowman's membrane	Histological or clinical evidence of increased tension
62	Iridocyclitis and secondary glaucoma in aphakic eye	—	Much corneal scarring and Bowman's membrane practically unrecognisable.
75	Recurrent attack of acute glaucoma	—	This patient had clinically given history of recurrent attacks of glaucoma for four years. Disc was not cupped and ganglion cells of retina normal. There had probably never been prolonged increase of tension and tension probably normal when excised.
93	Melanotic sarcoma of choroid	—	Disc normal, retina extensively so, ganglion cells not seen. Clinically the tension is stated to have been raised but from the histological appearance this does not seem to have been prolonged.
133	Glaucoma treated by trephine and with subsequent cataract operation	—	Pathological cupping of disc which has later been partially filled up with exudate. Extensive destruction of retinal ganglion cells. No corneal oedema. This case is instructive as suggesting that these bodies are not seen in an eye in which the tension has been normal for some time before excision though the evidence points to considerable pressure before the trephine operation.

In addition to this investigation of thirty-two cases, twenty-seven older slides were examined. Many of these were faded and had not been stained to bring out the bodies, but in eleven cases with signs of a raised tension these bodies were seen. In three cases they were not found when other histological evidence of glaucoma existed. I do not propose to publish this list of old cases in detail, but several interesting cases need comment. In a case of melanotic sarcoma of choroid and secondary glaucoma the bodies were absent, but the sarcoma was undergoing necrosis and possibly the tension had dropped to normal. In another case of iridocyclitis and secondary glaucoma they were absent but the cornea had undergone extensive ulceration. In an eye excised for glioma in a child of six a great many bodies were found.

Summary

(1) Structureless hemispherical bodies are found in Bowman's membrane in most eyes excised for glaucoma.

(2) The presence of such bodies is indicative that the raised tension is still present and is of at least three days standing.

(3) The bodies are often very faintly stained but are visible is carefully focused.

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EXFOLIATION OF THE LENS CAPSULE IN GLAUCOMA

BY

ALEXANDER GARROW

GLASGOW

THE subject of exfoliation of the lens capsule has not attracted much attention in the ophthalmological literature of this country. The first cases were published by Goulden, who described two at the Convention of English Speaking Ophthalmological Societies in London in July, 1925 (*Trans. Ophthal. Soc. U.K.*, Vol. XLV, Part 2, 1925). In Goulden's cases the condition was associated with cataract and there was no glaucoma. His Fig. 1 is a very typical representation of the curling forwards of the edge of the exfoliated capsule.

In the *Brit. Jl. of Ophthal.* of February, 1932, Dr. Mohamed Sobhy Bey of Cairo contributed a paper with a description of his pathological findings.

At a meeting of the North of England Ophthalmological Society in 1933 Foster, of Leeds, showed a case (*Trans. Ophthal. Soc. U.K.*, 1933).

The condition has attracted more attention on the Continent since Vogt of Zürich first described it and published an account of his first 12 cases in 1925 in the *Klin. Monatsbl. f. Augenheilk.*, Vol. LXXV, 1925.

Nine of these cases had glaucoma. This paper is accompanied by nine beautifully executed plates and the reader is referred to them for a very clear representation of what may be seen in this condition. Vogt's paper was followed by others in the Continental literature. In Sobhy Bey's paper in the *Brit. Jl. of Ophthal.* reference is made to many of these.

A paper by Hörven of Oslo appears in the *Acta Ophthal.*, Vol. XIV, 1936, with an extensive list of the literature and papers on this subject and on others relevant to the discussion of it.

Hörven first aroused my attention to this subject. He read a paper and showed cases in Oslo in June of 1937 to the visiting Ophthalmic Surgeons from the North of England Ophthalmological Society and I was privileged to be one of that party and to see some of the cases. This paper has now been published in the *Brit. Jl. of Ophthal.* for December, 1937.

Hörven found exfoliation of the lens capsule so frequently in glaucoma (in 80-90 per cent. of all the cases) that I was prompted to examine each case of glaucoma for this condition with the slit-lamp since my return from Oslo in June. Fifty-one cases have been investigated and in eight of them I have found exfoliation. These cases show such typical pictures that they are quite unmistakable and when one has become familiar with the appearances one is not likely to mistake the condition for any other.

Frequency.—The condition is found in diseases other than glaucoma, *e.g.*, cataract and sometimes in eyes which appear to be free from disease, but in a very small proportion of the cases examined. Although my investigation of the past six months has been more particularly directed to cases of glaucoma, I have looked for these capsule changes in the slit-lamp examination of all types of cases, such as one is likely to see in the ordinary routine of practice. I had not seen this disorder in any other condition than glaucoma until a month ago, since when I have found two cases.

The first was a man aged 68 years with very unhealthy eyes—high myopia with posterior staphyloma and choroidal atrophy, corneal opacity, irides atrophic and depigmented. The right eye

is blind from macular choroidal atrophy and showed no capsular change. The left eye is the seat of less extensive choroidal changes and showed a central film on the capsule with curled edge and specks of exfoliated lamella lying on it.

The second case was a well preserved and active man, aged 81 years, who had noticed defective vision of the right eye during the past few months. I found this to be due to incipient senile cataract. The other eye appeared to be normal and the retinal blood vessels were in good condition. Bluish white accumulations of exfoliated capsule were sticking to the margin of the pupils, and specks were lying on the lens capsule, and in the left eye there was a central pupillary film with a ragged curled-over edge.

Hörven quotes statistics of the findings of a number of observers. They vary very much but no one records such a high percentage of positive cases in glaucoma as Hörven (*e.g.*, Hörven in 80-90 per cent., Vogt in 5 per cent.), and he remarks that it is difficult to give an explanation of that. He suggests that the most reasonable explanation is that the material dealt with is not quite the same. He says that the prevailing type in Oslo is glaucoma simplex, and that chronic inflammatory glaucoma is seldom met with. Hörven goes the length of saying that exfoliation offers a basis of classification of glaucoma; that it occurs in the simple type only and never in acute or chronic inflammatory.

It is difficult to attempt any definite classification of glaucoma because occasional congestive attacks do occur in cases of "simple" glaucoma met with in this country and two of the cases of my series (Cases 6 and 7) sought advice in the first instance during a congestive attack of considerable severity.

My positive findings represent a percentage of 16 (8 in 51 cases).

The percentage of positive cases must, however, depend upon the width of the pupil at the time of the examination because the changes are more extensive and more easily seen in the periphery than in the central area, and the peripheral changes cannot be seen unless the pupil is dilated and this cannot be done indiscriminately in glaucoma. The presence of a surgical coloboma displays the periphery for examination in some cases.

The width of the pupil at the time of the examination should be recorded, in order to make statistics comparable.

Fig. 2 of Case 1 exemplifies this point very clearly. I will return to that in the description of the case.

In order to compare its frequency in glaucoma and in non-glaucomatous cases, Hörven examined 67 non-glaucomatous old people in a Home for the Aged in Oslo. This investigation was carried out with the same apparatus and in the same place as the

glaucoma patients and in all the cases the pupils were dilated with homatropine and cocaine.

He found two cases and states that this corresponds very closely to the number found in a similar investigation by Rehsteiner in asylums for the aged in Zürich.

Hörven's positive findings in glaucoma were 85 per cent. in 150 patients who had been operated on for simple glaucoma, and 93 per cent. in 43 cases of simple glaucoma not yet operated on.

Hörven sums up his positive findings as follows: 89 per cent. in 183 cases of glaucoma, 3 per cent. in 67 old people without signs of glaucoma, 18 per cent. in 55 admitted for operation for mature cataract.

Description of the appearance.—A slit-lamp examination is necessary, although when well marked some of the appearances can be seen with a corneal loupe and hand lens. The low power (Oc2 Obj. F 55) discloses the condition in some cases but it is advisable to use the high power (Oc2 Obj. a 2).

Before describing the appearances seen it will simplify matters if one makes some remarks upon the condition which gives rise to the appearances.

It seems to be entirely a degenerative process affecting the capsule of the lens in its most superficial lamella. This gives it a milky appearance and the lamella is prone to tear, and the torn edges may curl, usually in a forward direction. This milky film is not homogeneous. It has a dotted or grained appearance and the graining may be fine or coarse. The fine graining is sometimes difficult to see but the coarse graining is easily detected particularly near the edge of a tear. Pieces of this loose lamella may break off and lie on the surface of the anterior capsule and some of them stick to the margin of the pupil giving rise to what is known as the felt masses.

Trantas does not think that even at the beginning of the degenerative process there is a formation of the film over the whole surface of the lens and both Trantas and Vogt think that when the superficial lamella has peeled off the process may affect the next layer.

Vogt published in the *Klin. Monatsbl. f. Augenheilk.*, Vol. LXXXIX, 1932, the results of a microscopic investigation of the lamella with numerous photomicrographs. Chapter 48 is devoted to a description of the normal lamella and chapter 59 to diseases of it. In the diseased lamella the outer layer has a spongy appearance with the formation of vacuoles. This results in peeling in flakes. His photomicrographs illustrate all these changes.

Sobhy Bey made a pathological examination of an eye in which he had observed the changes *in vivo*. He illustrated his paper

with photomicrographs which show laminated masses on the pupillary margins and on the posterior surface of the iris, thicker in the furrows and thinner on the ridges. He found that this material is highly refractile like lens capsule, and has the same histological characteristics. He found, too, that depigmentation of the iris goes hand in hand with exfoliation.

These then are the changes which form the basis of the pictures seen, which may be conveniently described as they occur in three zones of the pupil :—

(1) Central zone.

(2) Peripheral zone.

(3) Intermediate zone.

The width of the pupil naturally determines which of these zones are displayed for examination.

If the pupil is dilated all three zones may be examined at one sitting, but in the case with undilated pupil the central zone only will be seen and perhaps also the central part of the intermediate zone.

A single case may show so many of the signs of the condition that even in the small group which I have examined I have seen most of the appearances figured in Vogt's plates and described in the text of his paper.

(1) *Central Zone.* (2-3 mm. pupil).—(*a*) *The Central Film.* The characteristic appearance here is a milky film which is homogeneous and not dotted as in the other zones. It is sometimes seen with great difficulty and in some cases it is very difficult to be sure of it, particularly if the smallness of the pupil prevents one from seeing its edge. The importance of seeing the edge of the film is that one appreciates a difference in the hue of the part covered by the film and the part not so covered and if an edge can be seen on it it is almost certainly a case of this degenerative change. If any part of that edge shows a curl it is certainly a case of it.

The film is more or less circular in outline and may have sticking on its surface bluish white felt masses which have broken loose. If these are present it confirms the case.

Trantas says that one sometimes sees a delicate curved white line on the capsule which makes one think that it may be the outline of a disc in formation, and that this may be confirmed later by finding a disc with that white line as its margin; he further says that these are not to be confounded with specks of pupillary membrane which never progress.

It is sometimes the delicate white margin which leads one to recognise the film itself.

Trantas points out that it is very difficult to see the central film in fully formed cataract for want of a dark background.

In one case I was misled in thinking I saw a milky film with an edge on it. By manipulation of the beam of light I found that the appearance of the edge was in reality a shadow effect of the margin of the iris cast upon the surface of the lens capsule.

(*b*) The surface of the lens should then be examined all round the margin of the pupil. In some cases milky patches may be seen coming into view from under the iris (see Plate II and Fig. 2). When the pupil is dilated these patches are found to be projections from the periphery. They are sometimes flat topped and sometimes tongue like, and either V or U shaped. On their surface the fine or coarse graining may be seen. The edge is often a delicate white line and a curling forwards makes a most characteristic picture when peeling has begun. With a small pupil it is only the tip of such a tongue which is seen; more of it, and perhaps other and shorter tongues, are seen with cocaine dilatation; while with full dilatation a series of similar tongues and flat topped processes may be seen all round the pupil. When a series of V-shaped processes is continuous the edge has a jagged appearance. Some of Vogt's plates show this edge to be rounded and quite irregular.

These conditions are quite unlike the films which may remain on the capsule after iritis.

(*c*) The bluish white masses may also be included in this description of the central zone because their detection does not depend upon the size of the pupil. They are as easily seen with a small as with a large pupil. These have been named felt masses but that term does not quite suit as a description of the slit-lamp appearances of the cases I have seen. The particles appear loosely packed and resemble in arrangement and in hue the superficial particles of tobacco ash on the end of a cigarette. They are accumulations of loose particles of exfoliated lamella. Vogt considers that they stick to the margin of the pupil because of the latter's fine corrugation. Plate III illustrates the appearance. In this case many of the particles were sticking on their ends on the iris stroma some little distance from the pupillary margin like minute hairs. Where one of the indentations on the iris margin is completely filled with these masses some stick on the stroma just peripheral to the indentation. This is evidently unusual because Hörven, who has seen so much of this condition, says that these particles are never seen on the iris stroma.

The arrangement of these masses is quite unlike that of organised exudate often found round the margin of the pupil after iritis.

Peripheral Zone. (4·5 mm. and more).—The peripheral zone can be seen only when the pupil is dilated. When the central zone is free of change a negative case may become positive when examined with a dilated pupil. A coloboma affords an opportunity of examining a part of this area without pupillary dilatation unless a large filtration bleb intervenes.

With a wide pupil a great variety of changes may be seen (see Plate 1 and Fig. 2). There is sometimes a continuous milky zone, more or less all round, and from this zone projections may be seen jutting in towards the centre of the pupil. These are sometimes rounded and sometimes pointed, giving a jagged appearance. From the peripheral border of this zone projections pass outwards. These projections have a radial appearance, and between the projections there are V-shaped spaces of normal hue. The axial edges of the projections may have curls and tears. Curls are usually in a forward direction. This jagged edge has a pattern which fits in to some extent to the edge of the film in the intermediate zone, suggesting that it has broken away from it there. The surface of this peripheral changed capsule has a white dotted appearance, the dots sometimes being fairly large giving a coarse grained appearance and sometimes they are very small giving a fine grained appearance. This graining is usually most marked near the edges. A characteristic feature of the edges is a fine white line on them.

The radial arrangement of this zone is a very striking feature and the reason for it is a matter of doubt. Vogt thinks that it is due to the rubbing of the ridges of the iris on the diseased capsule in the to and fro movements of the iris. A study of Vogt's illustrations of the normal lamella and of Plate I of this series suggests, I think, that there may be an anatomical basis for it and that it is caused by radial traction acting from the periphery. The common situation of the tears and the direction taken by the curling edge suggest this. These curling torn edges are usually on the tongue-like or flat topped axial projections of the peripheral zone and the direction of the curl is forwards and then backwards. In Plate I almost every axial projection has a curl. Vogt's plates show this too, while no curl is shown on the edge of a film in the intermediate zones, where such is present.

Trantas does not think that one can conclude that there has been a separation of the peripheral film from that in the intermediate zone. But some of the cases suggest this very strongly. The peripheral edge of the intermediate zone is usually very indefinite but its pattern often appears to fit in with the gaps and the prominences of the central margin of the peripheral zone as if they had at one time been continuous and had parted (? by the action of radial traction acting from the periphery).

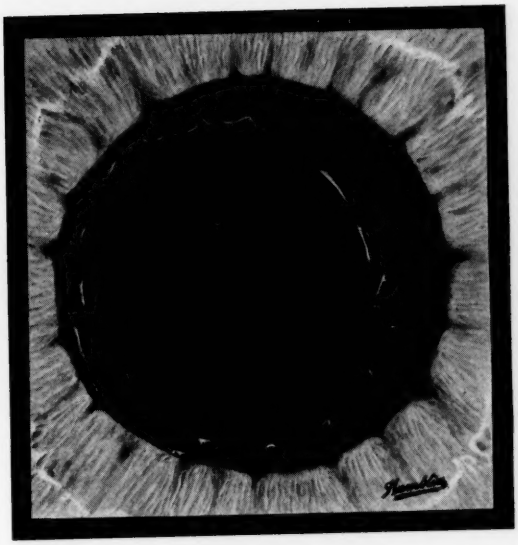

PLATE I.

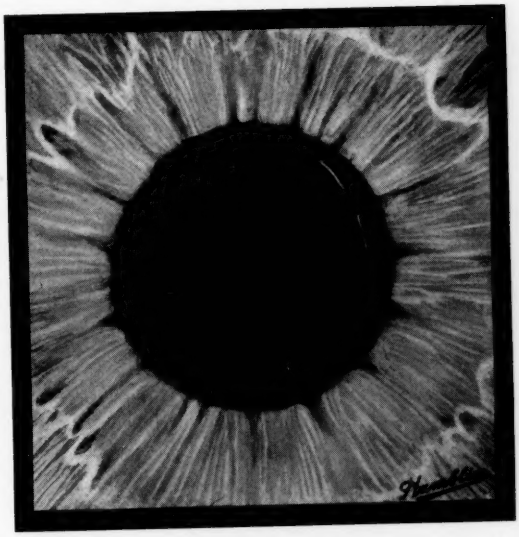

PLATE II.

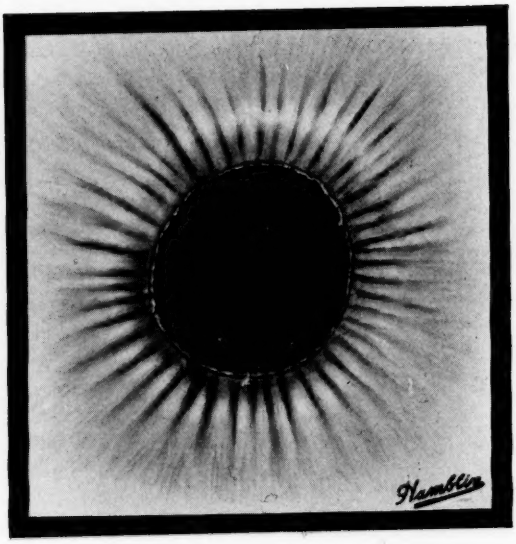

PLATE III.

Furthermore, in Case 1 (see Plate I) the V-shaped spaces which are devoid of film are not opposite iris ridges but opposite similarly V-shaped parts of the iris. Manipulation of the beam brings this out clearly and the artist has succeeded very well in depicting it. If the rubbing of the iris ridges is the cause of the radial arrangement one would expect that the film free spaces would be opposite a ridge and not opposite a furrow. The question is, however, difficult to determine because Sobhy Bey's micro-photograph shows more of the laminated exfoliation deposited in the furrows than on the ridges, but that is what one would expect because there is more room in the furrows for the accumulations of debris.

(3) *Intermediate Zone.* (3 to 4·5 mm. pupil).—This lies between the pupillary film and the pheripheral zone and consists of indefinite grained areas arranged concentrically round the zone. It is the least striking part of the picture and was not present in the cases from which the accompanying plates were made. It is figured as a complete band all round the pupil in only two of Vogt's eleven plates, with a band of normal hue between it and the central film on the one hand and between it and the peripheral band of film on the other hand.

The peripheral edge of it is usually indefinite and has an outline more or less corresponding to the central edge of the peripheral zone and suggesting that it has at one time been in contact with the latter. In this zone the edges do not show a curl in any of my cases; the film merges gradually into normal capsule. One uses the word " normal " for convenience. The capsule is almost certainly not normal in the parts which are not milky but have the normal dark hue.

Sometimes one or more bridges of film connect one zone with another, across the zone of normal hue.

Hörven states that it is difficult to explain the peculiar division of the changes in the capsule into a central disc and peripheral and intermediate bands and he does not think that it is due to the movements of the iris. If this were so, he says, it should follow that the central disc would be present just as often as the peripheral band; but in 10 per cent. of his cases he was unable to detect a central film.

The Coloboma.—A coloboma sometimes affords an opportunity of seeing a peripheral zone of exfoliation. In my eight cases there were seven eyes with colobomata in four of which the exfoliation was seen. In three its lower edge was in line with the margin of the pupil and was peeling, giving a fringed or frilled appearance, and in the other there was a reticulate arrangement. In one of these with a frilled edge there was a tongue-like prolongation towards the centre of the pupil.

All the changes above described are not seen in every case. Thus Trantas in 42 cases found all the changes in 23, *i.e.*, peripheral band, central film and the felt masses. In 12 there was just a peripheral band, sometimes associated with felt masses, but with no central film. In four there was just a central film with no peripheral change, and in three just specks on the capsule like those found in eyes which show all the changes.

In my own eight cases exfoliation was found in eleven eyes. In one of these the central film, the peripheral band and the felt masses were found, in four the central film and the peripheral film, in three the peripheral film only and in two the felt masses only, and in one a central film and felt masses.

There seems to be a difference of opinion as to whether or not the extreme periphery may be affected by these changes. Trantas says that it is not, whereas Hörven says that it is so constantly. He says that in excised eyes, where exfoliation is present, the changes are never wanting, and that they are always found *in vivo* if the suspensory ligament is at all visible. He finds that the suspensory ligament is densely covered with white scurf-like particles of the same appearance as the flakes on the pupillary border; but that one does not yet know if these are secondary, like the flakes on the pupillary border, or a degenerative change in the fibres, analogous to the affection of the capsule.

The Cause of the Condition.—It is almost certainly degenerative. Vogt discusses the point as to whether it is the cause of glaucoma, or glaucoma the cause of it. He decides that the latter is the more likely. But is it not more probable that glaucoma and exfoliation are not related to each other in the way of cause and effect, but that each is an expression within the eye of degeneration of tissue?

Trantas does not think that the syndrome depends upon glaucoma because in his 42 cases of it he found glaucoma in only 14. He was impressed by its association with other evidence of degeneration of ocular tissue such as cataract, vitreous opacities, depigmentation and presumably degenerative changes in the aqueous drainage passages, rendering such eyes prone to glaucoma.

There can be no doubt, however, about its association with glaucoma. In my own search for it over a short period of six months I found it in three cases in the first month in the glaucoma group, and I had to wait until the sixth month before finding it in a non-glaucomatous case, although during that period I had examined many more non-glaucomatous eyes than glaucomatous.

The question naturally arises: is this change of the capsular lamella of any practical importance?

(1) *Does it help diagnosis?*—I have not had an opportunity of

testing this in early cases. All the cases investigated for the purpose of this paper were well established. I understand that at Oslo it has been detected in some cases which ultimately became glaucomatous.

In this connection I will follow up at least two of my cases with interest. In Case 1 of the series the right eye is glaucomatous and the left eye has satisfactorily passed every test as being free of glaucoma although it is the site of wide-spread capsule changes (see Plates I and II and Fig. 2).

The non-glaucomatous patient, aged 81 years, already referred to, in whom I found felt masses all round the pupillary border of both eyes and a central film in one eye, is a medical man and I will therefore have an opportunity of examining his eyes as often as I may wish.

(2) *Does it affect prognosis?*—It has been suggested that this exfoliation once established is likely to aggravate glaucoma by blocking the filtration angle by debris. More histological examination is needed to decide this by finding deposits of the lamella in the angle. In Sobhy Bey's case which was histologically examined a mass was found crossing the angle from the pectinate ligament to the iris, but it was not highly refractile like the deposits on the back of the iris. He described the mass as homogeneous whereas the deposits of lamellae on the iris were laminated and his reference to it suggests that he did not consider it to be an accumulation of exfoliated capsule.

Sobhy Bey quotes Vogt as stating that the operative prognosis is not so good in cases with capsule changes as in those without them. This can scarcely apply to the Oslo cases in which Hörven has found the capsule changes in from 80 to 90 per cent. of all cases.

My own series is too small to enable one to form a comparison. The point can only be settled by the examination of a large series of cases and in order to be certain of the classification one would have to examine all the cases with fully dilated pupils and therein lies the difficulty in such a disease as glaucoma.

Cases of Glaucoma Showing Exfoliation

CASE 1. D.M., Aged 65 years.

First seen on April 8, 1937, complaining of defective vision of the right eye of six months' duration. No symptoms suggestive of congestive attacks.

R.E. T., 43. Glaucomatous cupping. Iridencleisis on June 16, 1937. September, 1937, T, 19 but lens becoming cataractous.

L.E. Apparently normal, although, as will be seen below, it is the seat of much more widespread capsule changes than the glaucomatous eye. Its tension has always been normal on repeated examinations with the tonometer. There is just a little concentric contraction of the peripheral field of vision, and examination on the screen with 1/2000 does not reveal any abnormality such as bareing of the blind spot, described by Traquair as the earliest field sign of glaucoma.

CAPSULE.

R.E. See Fig. 1. Peripheral film seen in coloboma with frilled lower edge; graining all over it, especially near a vertical split in the film. No central film, but in the central area of the pupil are a number of specks of exfoliated lamella and one rolled piece lying on the capsule.

FIG. 1. R.E. of Case 1.

The triangular shaded area represents a patch of subcapsular opacity in the lens.

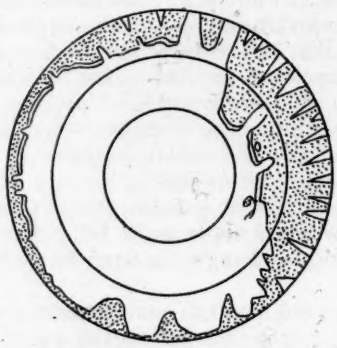

FIG. 2. L.E. of Case 1.

Shows how the size of the pupil regulates the visibility of the changes. The inner circle represents the 2 mm. pupil, the middle circle the 3·5 mm. pupil and the outer circle the 5 mm. pupil. With the 2 mm. pupil this case would be classified as negative. For details see the description of the capsule in L.E. of Case 1.

L.E. See Plates I and II and Fig. 2. The condition in the right eye just described above was found on July 1, 1937. On that date I noted the left eye as negative, but at that examination the pupillary diameter was only 2 mm. Subsequent examination with a pupil of 5 mm. showed a complete peripheral band of film.

On September 10, 1937, I made drawings of the condition seen in three degrees of dilatation of the pupil. I examined firstly with a 2 mm. pupil and found no change, then with a 3·5 mm. pupil and found three tongue-like prolongations, with curling of the edges, jutting out from below the iris from 1 to 3, then the pupil was further dilated to 5 mm. when it was found that these three tongues were just the longest of many others all round the periphery.

Three drawings were made and these have been combined to make Fig. 2. The inner circle represents the 2 mm. pupil, the middle circle is the 3·5 mm. pupil and the outer circle is the 5 mm. pupil. The figure shows how much a negative or a positive finding may depend upon the size of the pupil.

Plates I and II were made from drawings of this eye on November 10.

Fig. 2 and Plate I show the varieties of the shapes taken by the projections from the peripheral film towards the centre of the pupil—round topped, flat topped, and sharp pointed, already referred to in the description of the peripheral film; while the outer border shows the radial arrangement of the granular prolongations towards the periphery, separated by the V-shaped spaces of normal hue.

When examining an eye with a medium pupil one must look all round its margin in the search for grained tongues as seen in Plate I and Fig. 2. Their recognition requires careful focusing and manipulation of the beam of light, and one's attention to them is sometimes first attracted by the delicate white line of their edges. It has already been said that Vogt considers the sequence to be first glaucoma and then exfoliation. In this patient's left eye this sequence is reversed. Wide spread lamella degeneration is already present, but so far there are no signs of glaucoma.

Some changes in the film have been noted in the past two months. The tongues from 1 to 7 are not now so long as they were. Their ends are more curled over giving them a more flat topped appearance. In September a small oval hole was easily seen in the tongue at 3 (See Fig. 2). In November this hole was almost completely hidden by the curled over end of the tongue (see Plates I and II). A curved roll of lamella is sticking on the edge of the tongue at 4. The edge of the film is curled over forwards almost all round.

CASE 2. A.M., Aged 74 years.

Seen on July 29, 1937, complaining of defective vision of 5 months' duration. No history of congestive attacks.

R. and L. Glaucomatous cupping and atrophy, R.E. the worse. T.R. 60. T.L. 50. V.R. 3/60. V.L. 6/9 (pt.) Extreme contraction of field of vision L.E.

CAPSULE.

R.E. Felt masses all round margin of iris. No central film and no peripheral film when examined with 5 mm. pupil.

L.E. See Fig. 3. Felt masses all round. Faint central film with many bluish specks on it when examined with 3 mm. pupil. No peripheral film.

FIG. 3. L.E. of Case 2. Pupil 1·5 mm.

Particles of exfoliated capsule sticking to edge of iris and to each other.

This is the case from which Plate III was drawn.

The felt masses show a great variety of arrangement. The corrugations of the margin of the iris are packed with them. Some pieces stick by their ends on the margin of the iris, some pointing forwards, some towards the centre of the pupil and some outwards towards the iris stroma. Some are rod-like (? rolls of lamella) and where these stick to each other there is a branched effect. At one part a great number of extremely fine rods are sticking on their ends on the iris stroma like minute hairs. Depigmentation of iris.

R.E. which has no central film shows normal lens shagreen.

L.E. which has a faint central film shows no lens shagreen.

CASE 3. A.G., Aged 65 years.

L.E. Simple glaucoma when first seen in 1928. Not seen again until 1931. Trephined 1931. Lens now cataractous.
R.E. Now glaucomatous. T. 35. Cupping of O.D. V=6/9.

CAPSULE.

L.E. See Fig. 4. Coloboma 6 mm. in width, covered with peripheral film with frilled edge, rolled back in some places, in line with the margin of the pupil. Peripheral film all round pupil. A few specks and rolls lying on a central film which has several spots on it of normal hue, suggesting that the film has peeled off in these places.

FIG. 4. L.E. of Case 3.

Central film with exfoliated particles lying on it. Film in coloboma with frilled edge, curled forwards in places. Complete peripheral band.

R.E. (*a*) 2 mm. pupil—central film with specks on it. Some of these have branched effect.
(*b*) 7 mm. pupil—shows, in addition, a coarse-grained peripheral film from 4 to 8 o'clock. Also two felt masses in the upper quadrant. (See Fig. 5.)

FIG. 5. R.E. of Case 3. Pupil 7 mm.

Central film with loose particles on it. Peripheral film from 4 to 8. Felt mass at 10. The line at 11 represents a loose particle sticking at each end to the margin of the iris.

CASE 4. Miss H., Aged 75 years.

First seen in 1933. Both O.D.s cupped. Many vitreous floaters R.E. T.R. 25. T.L. 42. Both eyes trephined 1934.

CAPSULE.

R.E. Posterior synechiæ 8-12. Depigmentation. Anterior capsule sprinkled with iris pigment. No pupil film and no exfoliation.
L.E. See Fig. 6. Long piece of rolled lamella jutting out from below the iris at 11. Peripheral film showing below from 5 to 7. No changes seen in small peripheral coloboma.

FIG. 6 L.E. of Case 4.

Partial peripheral band below. Long piece of rolled lamella adherent above o the iris margin.

CASE 5. A.R., Aged 73 years.

First seen in 1925. L.E. had been trephined elsewhere in 1924 but was blind from optic atrophy, and R.E. was trephined by me in 1935. Both eyes are now practically blind, R.E. from cataract and L.E. from optic atrophy. He has been in receipt of pension as a blind man since 1931.

CAPSULE.

R.E. See Fig. 7. Exfoliation seen in coloboma; they appear as irregular greyish areas with crenated margins. A few delicate processes extend from the coloboma down towards the centre of the pupil. Pupil is fixed by posterior synechiæ and there are fluffy wisps of organized exudate between the iris and the lens.

FIG. 7. R.E. of Case 5.

Film in coloboma with crenated edge. Narrow radially arranged patches in the intermediate zone above.

L.E. Iris atrophic. Pupil fixed at a diameter of 5 mm. covered with thin layer of organized exudate, sprinkled with pigment.

CASE 6. Mrs. M., Aged 66 years.

Seen in 1936 with retinal hæmorrhage L.E. associated with kidney disease and high blood pressure. Seen for the second time on July 13, 1937, on account of an attack of congestive glaucoma L.E.

L.E. Corneal œdema T. + 3. No perception of light.

R.E. Retinal arteriosclerosis. O.D. appeared normal.

Seen for the third and last time on July 20, 1937, after a week on eserine. Cornea of the left eye had cleared and tension was normal.

CAPSULE.

R.E. Felt masses all round the pupilary margin of iris. No central film. Periphery not seen owing to small pupil.

L.E. No changes.

CASE 7. W.R., Aged 43 years.

First seen on June 15, 1935, on account of pain and defective vision R.E. of one week's duration. He was quite certain that he had never before had eye trouble.

On June 15, 1935, the condition was congestive glaucoma. R.E. with T. 105, corneal œdema. No K.P. Vision almost nil.

L.E. appeared normal, with V.A. = 6/6.

R.E. Iridectomy on June 21, 1935. A week later, cornea being clear, it was found that the lens was hazy, especially posteriorly. A year later lens more cataractous, and in February, 1937, it was noted as completely cataractous and T. 29.

L.E. has appeared to be normal throughout, but on February 4, 1937, T.L. was 25 and in July he spoke of coloured rings round the lights with L.E. He had never before complained of this eye and at the time he was disputing his fitness for work.

CAPSULE.

R.E. See Fig. 8. One posterior synechia from 4 to 5. Central film from which processes radiate outwards giving a rosette shape to it. A piece of peeled lamella sticks at one end to the lower end of the pillar of the coloboma and at the other end to the capsule, and on the latter there is a small space of normal hue from which the peeled piece of lamella had come. Reticulate peripheral film in coloboma.

L.E. No changes seen.

FIG. 8. R.E. of Case 7.

Reticulate film in the coloboma. Central film with short rounded projections from it. The upper triangle represents a piece of lamella which appears to have become peeled off the unshaded space below it. Its base sticks to a spur of iris at the lower end of the pillar of the coloboma. The unshaded spot below represents another place where a piece of lamella has been peeled off.

CASE 8. J. J., Aged 62 years.

This case is a good example of how much the relegation of a case into the positive or the negative group depends upon the size of the pupil. In July last with a 2-3 mm. pupil it was entered in the negative group. In January, with a 7 mm. pupil, the changes were found.

This patient was seen in February, 1930, with the complaint of D.V.L. of one month's duration, with haloes. The cornea was dull, T. was 85, and there was deep glaucomatous cupping.

R.E. appeared to be normal and its tension was 18.

L.E. was trephined and he ceased attendance in September of the same year. New blood vessels on the surface of the iris were noted then.

He was not seen again until May 17, 1937, when he came to the Out-patient Department, suffering from a severe attack of congestive glaucoma. L.E. The iris was atrophic and completely adherent to the lens and the eye was quite blind. Enucleation advised and refused. Eserine, pilocarpine and dionine prescribed and the attack passed off.

On that date R.E. appeared normal and there had been no symptoms referable to it.

On June 17, 1937, both eyes were examined with the Slit Lamp for the capsule changes and none were found, and his name was included in the negative group of my series. At this examination the pupil of R.E. was small, about 2-3 mm.

The patient was not seen again until January 17, 1938. He stated that the vision of his good eye had been gradually failing in the past month, and rapidly in the past week. No symptoms of congestion. The pupil was found to be dilated, 7 mm., and reacted very sluggishly to light, and the tension was 42.

(See Fig. 9.) An opportunity was immediately taken to examine the eye with the 7 mm. pupil with the Slit Lamp. A prolonged search failed to discover any of the capsule changes and one had almost decided to retain the case in the negative group when suddenly one perceived a few tongue-like milky

FIG. 9. R.E. of Case 8.

Central film with exfoliated particles on it. Peripheral band with jagged edge. A row of exfoliated particles are sticking to the edge of a projection at 2. Three radii in the intermediate zone above. Localised oedema of the cornea obscured the outer part of the capsule.

projections appearing from behind the margin of the iris. Careful focusing and manipulation of the beam so that the light was projected through the anterior chamber at a high angle displayed an almost complete peripheral band with sharp-pointed prolongations towards the centre, some of the prolongations were curled and one edge had a few bluish white specks on it. Part of the temporal margin of the pupil could not be seen distinctly on account of some localized œdema of the cornea there.

A faint but quite unmistakable central pupillary film was then seen with crenated margins and a few bluish white specks on its surface. This central film was not detected in July because the smallness of the pupil had prevented one from seeing the edge and thus one was denied the benefit of contrast between the central film and the surrounding area of normal hue.

A few narrow milky radii crossed the intermediate zone from the peripheral band to the central film in the region of 12 o'clock.

L.E. Iris densely adherent. Organized exudate and sprinkling of iritic pigment on the lens capsule. Lens partially cataractous.

Negative Cases

In this group there are 43 patients of whom 20 had had one or more congestive attacks. In 31 the glaucoma affected both eyes.

So far as this series of cases, positive and negative, is concerned, I can so far offer no explanation of the presence of exfoliation in the one group and its absence in the other. In the matter of age and the ordinary stigmata of degeneration, either in the eye or in the general bodily condition, there appears to be nothing to distinguish the one group from the other.

The duration of the glaucoma cannot be a factor because quite a number in the negative group have, to my knowledge, had glaucoma for ten years or more, and in the positive group the glaucoma had developed in the past year in three of the patients.

It must be borne in mind, however, that these exfoliation changes are more extensive and more frequent in the peripheral parts of the capsule than in the centre and that a case cannot be definitely pronounced to be negative until the periphery is examined, and that has not been systematically done in this series of cases.

Summary

Fifty-one glaucomatous patients have been examined for exfoliation of the capsule. In eight patients this has been found. Two of these had a congestive attack when they first came under observation.

No record has been kept of the number of non-glaucomatous patients examined by the slit-lamp during the period of this investigation, but in these it has been found only twice.

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ANNOTATION

The Remuneration of Medical Staffs of Voluntary Hospitals

IN 1932 a committee presided over by Lord Linlithgow and the Voluntary Hospitals Commission unanimously agreed " that the time has come to recognise the claim of visiting medical staffs to some share in the moneys raised for the treatment of patients in hospitals other than those provided by voluntary subscription or donation for the treatment of free patients."

In a recent circular the British Medical Association commenting on this matter drew attention to the change in hospital clientele, the majority of such persons can pay, desire to pay and do in fact pay directly or indirectly towards their treatment and maintenance. It is the view of the British Medical Association that there should be remuneration of the medical staff in respect of all medical services in hospital for which payment is made, directly or indirectly by contributory schemes, local authority, employer or patient.

There are many of our profession to whom the spirit of the Voluntary Hospital is very dear and who would not wish this changed in any way for fear of spoiling the enjoyment of work given gratuitously, but the nature of medical practice has changed in many respects and so has the social welfare of a large number of patients who now attend voluntary hospitals. Modern advances in diagnosis and treatment necessitating the use of elaborate equipment and laboratory facilities have made the value of hospital services appreciated and sought after by a section of the community outside the necessitous poor for whom all of us would give our advice and help freely. Whilst hospital services are exploited by some persons who are capable of paying for medical advice in private there are many who being unable to afford consultants' fees genuinely desire to make some contribution to those who have given to them professional skill and care. A number of contributory schemes assist the better paid workers to pay the hospital for such services, but there is still a group who are capable of making individual contributions. At the present time it seems that from these sources several tens of thousands of pounds are collected annually by the larger hospitals. In many cases this money has hitherto been taken over for general use, but recently some hospitals have allotted a percentage of this sum to a Staff fund. The proceeds of this fund have been devoted in some instances to the medical school, in others to the purchase of equipment, to the provision of a nurses' home and library, or it has been divided among the members of the Staff. It has been suggested in some hospitals that the sum thus collected should be held as a reserve from which assistance could be given to the widows and families of young men who die whilst they are on the junior staff of the hospital and before they have become financially established.

To avoid the possible distaste that some of the medical staff might feel in receiving payment whilst in the active practice of the hospital it has been suggested that the share allotted to each member of the staff should be allowed to accumulate or be used as an endowment insurance premium which could be realised on retirement from the staff or used in the event of sickness.

Events have already begun to move in the direction of payment for the medical staff in many voluntary hospitals. The establishment of contributory wards, salaries for pathologists, bacteriologists, radiologists and others it seems have come to stay.

Many of the necessitous poor for whom hospitals were originally intended now receive treatment from Municipal and Local Government Hospitals which are served by whole-time salaried medical staffs and by consultants who also receive payment for their work. Medical men are remunerated for their services in the National Health Insurance, Public Health, Tuberculosis, School Welfare, V.D. and other allied medical survices which have come under national control, but the consultant rank remains unremunerated for what is often very arduous work in the Voluntary Hospitals. It is the change of clientele attending the Voluntary Hospitals that calls for some financial adjustment which will allow the patients to maintain their self respect and at the same time be fair to those who are called upon to serve them. The administration of such affairs is full of difficulties, but many of these are not unsurmountable.

ABSTRACTS

I.—LENS

(1) **Wright, R. E. (Madras).—Lectures on cataract.** *Amer. Jl. Ophthal.*, January, February, March, April, 1937.

(1) **Wright** in four lectures discusses his views on cataract operations. He makes no special plea for any one method. He feels that the surgeon should adopt that surgical procedure which he believes is proper and safest for the patient under the circumstances and which he feels he is best able to perform. The author comments that the issue does not rest between selecting the extra-capsular or the intra-capsular operation but in judging which of these operations is best suited for the case under consideration. After long experience of many techniques in cataract extraction he is inclined more and more to rely on the extra-capsular operation removing a large piece of the anterior capsule. At the same time he admits the advantage of the intra-capsular operation in selected cases.

He discusses the contra-indications to intra-capsular extraction. When the pupil will not dilate fully for the purpose of this operation Wright cuts the iris sphincter at 6 o'clock with de Wecker's scissors.

He uses capsule forceps in some cases and the erisiphake in others when the capsule may be thin and the lens intumescent. In patients under 50 years of age he considers that intra-capsular extraction is contra-indicated as the zonule may be relatively more resistant than the capsule so that this latter would tear before the former. In the extra-capsular operation he cuts a large flap of anterior capsule in making the section and at the close of the operation he inserts a special pair of capsule forceps and seizing this flap removes it. The author favours a conjunctival bridge.

He comments on the fact that an intra-capsular extraction operation on an eye with evidence of old inflammatory trouble may leave the eye perfectly quiet.

In the prevention and arrest of haemorrhage he favours for arteriosclerotics and diabetics an intra-venous injection of calcium 1½ grs. in 10 c.c. of distilled water; haemoplastin and normal horse serum are used in treating recurrent haemorrhages; and antivenin solution 1:5,000 or a fine electro-cautery may be applied locally to a bleeding point. In dealing with iris that has become entangled with the Graefe knife in cutting the section Wright recommends that the knife be withdrawn, the anterior chamber filled with saline and the section completed rapidly after the insertion of a smaller knife.

He does not favour a bridle suture in the superior rectus muscle.

Lecture three is devoted to anterior segment and other post-operative complications. It deals at considerable length with iris incarceration and prolapse, iritis, pyogenous infections, vitreous impactions in the section, corneal opacities and keratitis, intra-ocular haemorrhage, mania and other conditions.

H. B. STALLARD.

(2) **Pavia, L. J.—A new medical treatment of senile cataract. (Altersstar, eine neue medikamentöse Behandlung).** *Klin. Monatsbl. f. Augenheilk.*, XCIX, p. 292, 1937.

(2) **Pavia** summarises the evidence for the importance of vitamin C to the lens, and gives the result of treatment of cases of senile cataract with vitamin C. Subcutaneous injections of 3-5 mgm. doses on alternate days, caused only slight improvement in four out of seven cases. Intravenous injections caused a rise in urinary excretion of vitamin C, when this had previously been below normal.

The article illustrates the difficulty of accurate dosage, and of the interpretation of results in clinical experiments of this nature.

D. R. CAMPBELL.

(3) **Kiss, W. (Innsbruck).—Visual acuity in early childhood, following bilateral operation for cataract. (Sehscharfe der in fruher Kindheit doppelseitig Staroperierten).** *Klin. Monatsbl. f. Augenheilk.*, Vol. XCVIII, p. 523, 1937.

(3) **Kiss** gives statistics from the eye clinic at Innsbruck which show that less than half of the cases of congenital blindness due to cataract can be rendered eligible for ordinary schools or occupations, whereas those who have a certain amount of vision before operation do much better. The poor results in the first group are due partly to complications in healing—particularly iris prolapse, which are liable to occur in children under the age of one year, and to the unsatisfactory home conditions which they experience in their subsequent years.

D. R. CAMPBELL.

II.—GLAUCOMA

(1) **Vogt, A. (Zürich).—The result of diathermy puncture of the ciliary body in glaucoma. (Ergebnisse der Diathermiestichelung des Corpus ciliare (Zyklodiathermiestichelung) gegen Glaukom).** *Klin. Monatsbl. f. Augenheilk.*, Vol. XCIX, p. 9, 1937.

(1) **Vogt** describes another operation for glaucoma which he has tried in cases of previous unsuccessful operation. The conjunctiva is reflected by a circular incision 4-5 mm. from the limbus and a number of diathermy punctures (60-100 each per ½-second) are made in a zone between 2½ and 6 mm. from the limbus, a current of 60-70 milliamps is used. The needle must be 0·5 mm. long and 0·18 to 0·2 mm. thick; a longer needle is likely to cause a clouding of the lens.

The author suggests that this method checks the formation of aqueous humour by the ciliary body, which may occur to excess in the glaucomatous eye. The method is useful in difficult cases of secondary glaucoma.

D. R. CAMPBELL.

(2) **Denig, R. (New York).—Iridotorsion in comparison with trephining, Lagrange's operation and cyclodialysis. (Die Iridotorsion im Vergleiche mit der Trepanation, der Lagrangeschen Operation und der Zyklodialyse).** *Klin. Monatsbl. f. Augenheilk.*, Vol. XCIX, p. 1, 1937.

(2) **Denig** describes a new operation for glaucoma in which a conjunctival flap is reflected above the limbus and slightly to the nasal side. A small incision is made with a Graefe knife 1½ mm. from the limbus, and an iridectomy performed. The excised piece

of iris is left adherent to the root of one pillar and is twisted to form a small cushion. Out of 154 cases 138 had normal intra-ocular pressure subsequent to this operation. The author discusses its advantages in comparison with Lagrange's operation or cyclodialysis.

D. R. CAMPBELL.

(3) **Marucci (Pavia).—Juvenile glaucoma associated with changes in the retinal vessels. (Glaucoma giovenile con angiomatosi retinica).** *Arch. di Ottal.*, March, 1937.

(3) **Marucci** describes an unusual case of glaucoma occurring in a young woman: the symptoms dated back some three years. The right eye showed loss of acuity to 3/10, and contraction of the visual field. The left eye, in which the symptoms had begun later, had central acuity of 8/10; the field, though contracted was larger than the right; in neither had there been pain though the pressure was about 75 mm. The unusual condition was the state of the vessels at the optic disc; here there was a tangled mass of small arteries with some large veins and some arteries of nearly normal calibre which made exit from the cup and overran the margin and the surrounding retina.

The author discusses the relation of this vascular condition to the glaucoma and concludes that it is merely coincidental; that the tangled vessels are probably a congenital anomaly, due to an atypical division of the arteria centralis and not an acquired angiomatosis. On the other hand there may have been an angiomatosis of the choroid which may have been dependent on the condition of the retinal vessels.

HAROLD GRIMSDALE.

III.—MISCELLANEOUS

(1) **Myerson, Abraham, and Thau, William (Boston).—Human autonomic pharmacology.** *Arch. of Ophthal.*, July, 1937.

(1) **Myerson** and **Thau's** paper is one of a series on autonomic pharmacology and contains some interesting observations on the ocular effects of cholinergic and adrenergic drugs. Since these involve the theory of nerve actions a short preamble on this subject is necessary. Responses to stimulation of the sympathetic and para-sympathetic nerves are probably brought about by the production of acetyl choline at the neuronic synapses. This substance can be destroyed by choline esterase, an enzyme which causes its hydrolysis, and whose production accounts for intermittency in activity of acetyl choline. Although acetyl choline is liberated at the synapses

of both the sympathetic and para-sympathetic nerves, a substance "sympathin E" akin to adrenalin is produced only in the sympathetic system. In the authors' experiments, in place of acetyl choline they used mecholyl, a substance with the same effects but much more powerful. Prostigmin destroys or inhibits the esterases and therefore is a marked synergist of mecholyl. Atropine on the other hand abolishes the effects of mecholyl by directly changing the chemical reactions which take place between the reacting cell and acetyl choline so that the effects of the latter are abolished. The action of adrenalin is opposed by acetyl choline, atropine therefore acts as its synergist, by removing the acetyl choline brake. The action of benzedrine, is similar to that of adrenalin though it shows some divergences from it. Bearing these points in mind, the authors proceeded to instil these drugs into the eyes of various individuals with the following results:—1. Mecholyl, the pupil became pin point and pressure was lowered by 3-5 mm. Hg, the palpebral fissure became narrowed and the retinal vessels dilated. All these effects were entirely abolished by atropine. 2. Prostigmin — the effects were similar, but less marked, *i.e.*, when the esterase is removed, the eye itself manufactures sufficient acetyl choline to allow of its effects becoming manifest. If the two substances, mecholyl and prostigmin were given together both in subminimal doses, a reaction was produced owing to their synergism. 3. Benzedrine sulphate—adrenergic effects became evident and the pupil dilated though the reaction to light was maintained. An extraordinary effect was evident in cases of Argyll Robertson pupil, which was found to enlarge and to regain its reaction to light. Widening of the palpebral fissure also occurs with benzedrine and there is an increase of 2-4 mm. in the intra-ocular pressure. Atropine was found to be synergistic, subliminal doses of the two drugs together, producing marked mydriasis. 4. Atropine—the ordinary effects of this are sufficiently well known not to need description. It invariably abolished the effects of mecholyl but when the latter was combined with prostigmin, the abolition was neither so striking nor complete. Atropine does not widen the palpebral fissure and in this respect is not synergic with benzedrine thus illustrating the fact that it has no direct power of stimulating the sympathetic and produces its effects merely by inhibiting the action of acetyl choline. The effects of these drugs on the intra-ocular pressure is interesting and may provide a clue to the pathology of glaucoma. Put briefly the pressure falls with cholinergic stimulation or inhibition of the esterases (*e.g.*, by prostigmin) while it increases when the action of these substances is shut off (*e.g.*, by atropine) or when the antagonist adrenergic stimulation occurs (*e.g.*, by instillation of benzedrine).

F. A. W-N.

(2) **Dyar, E. W. and Mathew, W. B. (Indianapolis).—Use of sucrose preparatory to surgical treatment of glaucoma.** *Arch. of Ophthal.*, July, 1937.

(2) After reviewing the various methods of pre-operative reduction of pressure in glaucomatous eyes, **Dyar** and **Mathew** came to the conclusion that none of them is really satisfactory. The ideal method would be to introduce into the blood some substance which would render it hypertonic, would not diffuse into the aqueous and could be excreted completely by the kidneys. Sucrose possesses many desirable features when used intravenously. The molecule is large, and therefore does not readily pass through the capillary wall into perivascular spaces, it is not broken down in the body, is not contraindicated in diabetes, and is unabsorbed by any tissue of the body and is wholly excreted by the kidneys. The authors, as a routine, have used 400 c.c. of a 25 per cent. solution injected into a vein over a period of 45-60 minutes, and the results in 20 patients suffering from various types of glaucoma have been uniformly encouraging. One striking feature was that the tension was reduced to a relatively constant reading (12-22 mm. Hg Shiötz) regardless of its height prior to the use of sucrose.

F. A. W-N.

(3) **Fontana (Modena).—The action of dinitrophenol on the eye. (L'azione del dinitrofenolo sull'occhio).** *Rass. Ital. d'Ottal.*, March-April, 1937.

Ciotola (Rome).—Cataract from the use of alpha-dinitrophenol. (La cataratta da alfa-dinitrofenolo). *Boll. d'Ocul.*, May, 1937.

Cordero (Pisa).—The action of alpha-dinitrophenol on the eye. (L'azione dell' alpha-dinitrofenolo sull'occhio). *Arch. di Ottal.*, March, 1937.

(3) The use of dinitrophenol as a means of "slimming" is very general in certain communities, especially in the United States: it has been proved to be sometimes dangerous. **Fontana** wished to discover whether the drug had deleterious action on the eyes of laboratory animals; to this end he treated rabbits but was unable to observe in any case any lesion of the eyes, although the treatment was prolonged over a considerable number of weeks.

Ciotola gives a resumé of the effects of the drug administered in different quantities. In large doses (60 mgr. per kilo) the blood pressure falls rapidly and death follows quickly. With smaller doses (20 mgr. per kilo) the body temperature rises to extreme heights (44° or 46° C.) and often death follows; sometimes there is a gradual return to normal. When death occurs, the post-mortem appearances resemble those of heat-stroke.

With still smaller doses (3-5 mgr. per kilo) there is great increase of metabolism, especially of the muscles, and this is the chief reason

for use of the drug as a "slimming" agent. Ciotola has seen one case in which a prolonged treatment with dinitrophenol for obesity was followed by the appearance of incipient cataract; it has been suggested that the lens change is due to the action of dinitronaphthol contained as an impurity in the dinitrophenol. He examined the drug which was being taken, carefully but could find no trace of impurity.

He, also, has made a number of experiments on animals, but has not noted the appearance of cataract in any.

Cordero promises a full account of the action of the drug. The first part of his paper, only, is contained in this number of the Journal.

HAROLD GRIMSDALE.

(4) **Collenza (Florence). — Diabetes in ophthalmic surgery. (Diabete e chirurgia oculare).** *Boll. d'Ocul.*, July, 1937.

(4) Diabetes is always a serious complication when any surgical procedure is thought advisable. The tissues of a diabetic are less able to undergo an operation with impunity; they bleed more freely than normal, and the wounds are slow in closing. Sometimes the conditions leading to operation are due to the diabetes, but more commonly are simply coincidental. In former time the risk attaching to any ocular operation in a diabetic was so great that all were thought impossible. Since the treatment by insulin has been adopted, the risk is much less.

We must remember that the really important thing is not the sugar in the urine but the blood sugar; glycosuria is not the same as diabetes, and glycaemia may exist without glycosuria. **Collenza** gives the records of 114 diabetics on whom some ophthalmic operation was performed; most of these were operations for cataract, but there were a number of cases of glaucoma, and some other conditions. All were treated before operation by insulin and appropriate diet; one of the chief risks is haemorrhage, and it is necessary before operation to investigate the condition of the blood vessels and the arterial pressure. With these precautions, all the cases recovered from the operation. Except in cases of cachexia it is not necessary to refuse operation to any diabetic. This is the conclusion of the author.

HAROLD GRIMSDALE.

(5) **Nicolato (Pavia).—175 cases of the dacryocystitis operation of Dupuy-Dutemps. (Di 175 casi di dacriocistite operati secondo il metodo di Dupuy-Dutemps).**—*Boll. d'Ocul.*, August, 1937.

(5) **Nicolato** has operated on 175 cases of dacryocystitis by an external incision, and a large removal of the inner bony wall of the nasal duct. He claims that this is a more surgical procedure than

excision of the sac, which necessarily interferes with the normal outflow of tears, and that it is almost always successful in restoring a passage for escape of the tears. The author has modified the original method making the breach in the bony wall larger, and therefore less likely to be unduly narrowed in course of the healing. He removes the lacrymal crest and a large part of the nasal bone. "In every case one must completely empty the anterior ethmoidal cell so as to lay bare the nasal mucous membrane." He divides the nasal duct as low down as possible, divides the inner wall in its whole extent from below, and opens the nasal mucous membrane for about three-quarters of an inch, vertically, through the bony gap. He then stitches the deep edge of the sac to the deep edge of the nasal wound; a doubly armed suture is then passed through the lowest part of the membrane of the duct, so that the loop is on the mucous membrane, carried through the gap into the nose and stitched to the nasal mucous membrane; then the anterior border is united to the anterior border of the nasal wound, and the skin wound sewn up.

HAROLD GRIMSDALE.

(6) **Borsotti (Pavia).—Ocular accidents after blood transfusion. (Incidenti oculari in seguito a trasfusione di sangue).** *Boll. d'Ocul.*, August, 1937.

(6) It is rare for the eyes to be affected under transfusion. **Borsotti** gives an account of two cases in whom transfusion was followed by serious affection of the eyes. In the first, the patient, aged 27 years, had suffered from weakness and exhaustion after a normal labour; this continued for years. As various treatments had been tried without success, a transfusion was suggested, and by accident was made from an unsuitable donor; haemoglobinuria followed, with rigors and nausea. Some days later she complained of dimness of vision and the acuity of the right eye was found to be 1/50, the left being normal; the fundi showed oedema round the disc with fulness of the veins. The right visual field was much contracted. Six weeks later the oedema of the retina had almost disappeared and the vessels had become normal but the disc was pale. The diagnosis was optic neuritis and by exclusion, it was supposed to be of a toxic nature from the transfusion.

In the second case a man suffering from lymphatic leukaemia was given four transfusions; the first from a relative belonging to the same blood group as the patient, the second and third from a universal donor, the last from the first donor again; this was followed by severe visual disturbance and examination of the fundi (which had not been examined before) showed extensive retinal haemorrhages. The patient died a few days later.

The author has found several other records of retinal haemorrhage after transfusion, all of which suffered from some serious form of anaemia; in most of them death followed within a short time of the transfusion. He thinks that the appearance of retinal haemorrhages is a sign of great gravity.

HAROLD GRIMSDALE.

(7) **Caramazza (Bologna).—The effect of lumbar puncture on paralysis or paresis of the external ocular muscles. (Influenza della rachicentesi sulle paralisi o paresi dei muscoli oculari estrinseci).** *Riv. Oto.-Neuro.-Oftal.*, November-December, 1936.

(7) **Caramazza** has used lumbar puncture in a number of patients suffering from paresis of the ocular muscles; it is well known to be of value where there is increased intra-cranial pressure, and the cases which he cites in this paper are precisely those which show no signs of serous meningitis. Not only was there no clinical sign of increased pressure, but the pressure was not found to be raised when the puncture was made. Nine cases in all are reported; in two, the treatment had no effect; in the others, benefit—in some complete cure—followed lumbar puncture, repeated if it seemed hopeful.

It must be remembered that though increased endocranial pressure usually is accompanied by increased intraspinal pressure a reduced pressure, as found by lumbar punctate, does not necessarily mean a low intracranial pressure. Some cause other than the reduction of pressure must be sought to account for the results. The author hopes that further trials may be made.

HAROLD GRIMSDALE.

(8) **Balcet (Rome).—The serum-diagnosis of syphilis. (La siero-diagnosi di sifilide in oculistica).** *Boll. d'Ocul.*, July, 1937.

(8) When Wassermann first proposed his reaction, adding serum from the suspected source to an extract of liver from an hereditary syphilitic, it was believed that the reaction was due to the presence of an antibody and its appropriate antigen.

It was soon shown that the extract of such a liver was not needed to give the reaction, and that a solution of cholesterin of a certain concentration would act as well. A new explanation was given, namely that we had to do with a micro-flocculate revealed by the fixation of the complement and consequent absence of haemolysis.

Other methods were sought for, simpler and more rapid than that of Wassermann. **Balcet** has compared the accuracy of the reactions

of Khan, and Meinicke and the Citochol method with that of Wassermann and finds that they are more accurate and simpler than the parent method.

HAROLD GRIMSDALE.

(9) **Collenza (Florence).—Pigmented naevus affecting the contiguous parts of both lids. (Nevi divisi pigmentari delle palpebre).** *Boll. d'Ocul.*, April, 1937.

(9) **Collenza** gives a history of two cases of this unusual condition, and discusses the origin and nature of pigmented moles in general and of these special forms. He concludes that their pigment cannot be derived from blood, since it contains no iron, but that it is a product of the metabolism of the tissue cells. It seems probable that such "melanoblasts" are epithelial in origin and that the whole tumour is derived from the epiblast. The position, on the contiguous parts of the two lids, is best explained by supposing that the tumour arises before the separation of the lids, in the position of the future palpebral fissure. The author draws attention to the importance of the deformity in the matter of appearance and shows how greatly operation improves appearance, and how easily it may be performed.

HAROLD GRIMSDALE.

(10) **Uyemura, M., and Suganuma, S. (Tokyo).—A new ophthalmodynamometer. (Ueber einen neuen Ophthalmodynamometer).**

Uyemura, M.—The pressure in the capillaries in the macular area. (Ueber den Blutdruck in den Capillaren der Maculagegend der Netzhaut). *Klin. Monatsbl. f. Augenheilk.*, Vol. XCVI, pp. 481 and 325 respectively, 1936.

(10) **Uyemura** and **Suganuma** describe a new dynamometer constructed on the Bailliart principle and the first author reports his observations made on the pressure in the macular capillaries. He found it to range between 34·2 and 23·0 mm. Hg, with a mean of 28·97=0·2878. The principle employed was the entoptic phenomena associated with macular vessels. Entoptic visualisation was achieved by a 200-watt lamp and suitable filters. The light dots in the entoptic lines are the spaces between the red blood corpuscles. By means of suitably applied pressure the width of these spaces and the rapidity of movement can be affected, and transient observation of vision achieved. The pressure in the vessels is taken as that pressure necessary to slow down the movement in the entoptic lines. This occurs rather suddenly.

ARNOLD SORSBY.

(11) **Neméth, L. (Budapest).—The reticulo-endothelial system of the eye with special reference to purulent keratitis. (Das reticuloendotheliale System des Auges, mit Rücksicht auf die eitrigen Hornhautentzündengen).** *Klin. Monatsbl. f. Augenheilk.*, Vol. XCVI, p. 613, 1936.

(11) **Neméth** studied the distribution of reticulo-endothelial cells in the eye by means of vital staining with trypan blue and lithium-carmine injected intravenously. He found that histiocytes predominated and that they were present in the normal rabbit in all parts of the eye, the cornea excepted. The conjunctiva and ciliary body were particularly rich in such cells. By producing infective lesions in the cornea, reticulo-endothelial cells could be demonstrated in the affected tissue, making their appearance on the third day (when the reaction is sufficiently severe) and ending by outnumbering the polymorphs by the 15th to 20th day. The author holds that the reticulo-endothelial cells are phagocytic and exert their action in the later phases of the infection.

ARNOLD SORSBY.

(12) **Riedl, F. (Graz).—Hereditary congenital optic atrophy. (Zur vererbten, angeborenen Sehnervenatrophie).** *Klin. Monatsbl. f. Augenheilk.*, Vol. XCV, p. 332, 1935.

(12) **Riedl** recalls Stählin in a comprehensive review in 1931 (*Arch. f. Augenheilk.*, Vol. CIV, p. 222) distinguished as distinct from the European and the Japanese forms of Leber's atrophy two further types: a Behr's complicated hereditary optic atrophy (complicated by neurological lesions) and a congenital hereditary atrophy, "probably recessive in character." The author reviews the 17 family histories of such cases reported in the literature and adds a group of his own in which two and possibly three generations were affected. On a critical survey of this collected material he holds that the inheritance is probably dominant. As his cases showed temporal pallor, X-ray investigation of the sella was undertaken, this proved negative.

ARNOLD SORSBY.

(13) **Bothman, Louis (Chicago).—Repair of choroidal detachment.** *Arch. of Ophthal.*, July, 1937.

(13) **Bothman,** in this article, describes an interesting operation for choroidal detachment. His patient had been trephined for glaucoma and although the anterior chamber reformed, a choroidal detachment persisted in the upper part of the fundus over a period of eight months. Posterior sclerectomy and evacuation of the subchoroidal fluid was of no avail, so it was decided to bring about partial closure of the trephine hole. A conjunctival incision 15 mm. long was made—under local anaesthesia, parallel to the limbus and

8 mm. above it. The conjunctiva and Tenon's capsule were lifted and the sclera exposed to the limbus. The superior rectus was picked up with a squint hook and its central 2 mm. freed from the remaining portion with a small hook. A single fine silk suture was placed in this portion near the insertion and it was cut away from the sclera with scissors. Five mm. of the distal portion of the muscle was cut off and the resulting strip placed on the sclera over the trephine hole, parallel to the limbus. It was fixed to the conjunctiva with three silk sutures and the conjunctival wound then closed. Three weeks later the choroid was back in position. The patient's lens was becoming opaque however, and extraction performed through an incision below gave a good result. The author concludes his article with the statement "Repair of all choroidal detachments in seeing eyes which persist for three months should be attempted."

F. A. W-N.

(14) **Bockoven, Starling, and Wilcox, Blanche (Washington).—Significance of retinal fatigue in the study of general and nervous diseases.** *Arch. of Ophthal.*, June, 1937.

(14) **Bockoven** and **Wilcox's** test is performed as follows. The patient is seated in front of a table covered in a neutral shade of green. Testing cards of the same shade are used and in the centre of each is a square of one of the standard Heidelberg papers (red, yellow, blue, green and white) marked at its centres with a small black dot. An illumination of 25 ft. candles is employed. One eye is occluded and the patient directed to fix the other on the small black dot without winking or changing his gaze. After a short time a wave of darkness or of mottling passes over the paper and the period in seconds for this to occur is taken as the "fatigue time." In normal eyes it was found that fatigue occurred earliest when the patient looked at the red card, next in order came yellow, then blue, white and last green. Increased retinal fatigability was found in neurasthenia and in patients with foci of sepsis. Simple hypertension lessens fatigability, retinal arteriosclerosis increases it. It was more marked in cases of malnutrition than of tuberculosis.

F. A. W-N.

(15) **Woelfflin, E. (Berlin).—Further investigations on dark adaptation of the cones. (Weitere Untersuchungen zui Dunkel adaptation der Zappen).** *Klin. Monatsbl. f. Augenheilk.*, Vol. XCVIII, p. 621, 1937.

(15) **Woelfflin** records the course of dark adaptation for cone vision by testing the light and "form" thresholds. The former increased to 10-55 times the value of the initial threshold, after

25 minutes dark adaptation. Patients with a high original value show a rapid decrease in the first 5-10 minutes. In some patients the binocular threshold is the same as for monocular vision, and in others it is lower—usually half the monocular value. Momentary exposure of an eye to a weak light after 20 minutes dark adaptation, causes the light threshold to be decreased—a phenomenon which is probably cerebral and not retinal in origin. Cases of total colour blindness and of hemeralopia were investigated. The original paper should be consulted for experimental and clinical details.

D. R. CAMPBELL.

(16) **Dandy, Walter E. (Baltimore).—Intra-cranial pressure without brain tumour. Diagnosis and treatment.** *Annals of Surgery*, October, 1937.

(16) **Dandy** gives the case histories of "22 patients in each of whom the signs and symptoms of intracranial pressure have been indubitable, and yet in none has there been any intracranial tumour or a space occupying lesion of any kind."

In most of these cases a clinical diagnosis of unlocalized tumour was first made, but tumour was excluded by ventriculography. Every patient complained of headache, most of them had nausea, vomiting, diplopia and dizziness, while many of them had loss of vision. In each case there was bilateral papilloedema and usually haemorrhages in one fundus or both.

In each case the intracranial pressure was objectively demonstrated and actually measured by ventricular or lumbar puncture. "Finally the subsequent demonstration of pressure over a period of months or years is merely a matter of inspecting the site of the subtemporal decompression to which most of these patients were subjected for treatment."

The raised pressure may last only a few months, but at times it persists for five to seven years, or perhaps longer.

The case histories are spread over the last ten years, and are illustrated by pictures of the fundi of case 1, which leave nothing to the imagination as to an extreme degree of papilloedema with multiple haemorrhages being present, and ventriculograms of case 2. As to age, the youngest patient was nine-and-a-half, two others were under 20, and one was exactly 20. Seven cases occurred in the second decade. The oldest patient was 48. Sixteen were females and only six males.

The main symptoms are analyzed carefully and the paper is supplemented by an excellent table which sets out in columns every available fact.

The cerebro-spinal fluid, intracranial pressure and ventriculography are discussed in separate paragraphs.

Treatment is upon a mechanical basis. A right subtemporal decompression is performed if the symptoms and objective signs indicate its need. In four of the cases the indications pointed to a mild degree of raised pressure; they were kept under observation as to vision and state of fundi and were not operated upon. The cause of the condition is unknown; in only one case was the Wassermann reaction positive in the blood and cerebro-spinal fluid. In one case an inflammatory lesion had to be considered. The author appears to favour variations in the intracranial vascular bed as a cause, probably by vasomotor control. He says:—

"The very rapid increase and decrease of the decompression—in two or three minutes from one extreme to the other—could hardly occur except from variations in the vascular bed; certainly the change is much too rapid for an increase or decrease of cerebro-spinal fluid. And secondly, fright, fatigue, mental or physical, and sudden nervousness may cause the decompression to become tense very rapidly." The patient was highly emotional in at least one case.

The paper was discussed by Dr. Wilder G. Penfield, of Montreal, and by Dr. Alfred Adson, of Rochester, Minn., and Dr. Dandy replied.

A most interesting communication which well repays perusal.

R.R.J.

(17) **Alabaster, E. B. (Birmingham).—The aetiology and treatment of convergent concomitant strabismus.** *Irish Jl. Med. Sc.*, June, 1937.

(17) **Alabaster** in the Mary Louise Prentice Montgomery Lecture, delivered at Trinity College, Dublin, on April 21, 1937, reviews the historical features of convergent concomitant strabismus.

In discussing retinal rivalry he states that in order to obtain fusion the images must be of a similar outline and must fall on similar or corresponding retinal points. He emphasizes the point that outline is more important in fusion than colour.

The nature of the visual fields in concomitant and paralytic squint is discussed.

He describes an apparatus designed to demonstrate that in concomitant squint the higher centres are conscious of the direction in which the squinting eye is looking whereas in paralytic strabismus this is not the case.

The author believes that divergence dissociated from accommodation tends to produce suppression, and that the dissociated movement of convergence will enable a squinter to avoid diplopia. In fact convergence in these cases is purposive, the patient producing it in order to avoid diplopia.

The author states that three rules are necessary for fusion (1) similar images (2) corresponding retinal points (3) similar impulses to the muscles concerned.

It appears that he has had some remarkably good results in the treatment of cases of abnormal retinal correspondence (loss of foveal fixation). In some clinics all attempt to treat these cases is regarded as a waste of time. At the Children's Hospital, Birmingham, 25 patients with loss of foveal fixation have been cured. The treatment of this condition is effected by occlusion and by teaching the child to maintain its gaze in a direction which places the corneal reflex at a point just to the nasal side of the centre of the pupil. The child is instructed to perform repeated movements of the eye from the squinting position to this position of true fixation and to remember what it feels like to hold the eye thus.

Other details of orthoptic training are discussed. The author comments on the improvement in the mental stability of the child during treatment, and at the end of this admirable lecture he gives an epitome of a number of suggestions in the orthoptic training of squinters. It is interesting to note that at the Children's Hospital, Birmingham, he has reduced the number of cases requiring operation from 50 to 15 per cent.

H. B. STALLARD.

(18) **Josephson, E. M. and Freiberger, M. (New York).—Carotene therapy of retinitis pigmentosa.** *Nature*, Vol. CXXXIX, p. 155, 1937.

(18) The loss of dark adaptation and night blindness in the earliest stages of retinitis pigmentosa, suggested to **Josephson** and **Freiberger** that one of the fundamental features of the pathology of the disease is a failure to utilize carotene and vitamin A.

Oral administration of this substance in large doses had no effect on the course of the disease. Intra-muscular injection of carotene in oil, 30,000 to 60,000 New U.S.P. units one to three times a week produced a relief of night blindness in all the early cases of retinitis pigmentosa within one week of beginning treatment and dark adaptation became comparable to normal within one to four months. However, up to date these authors have noticed no improvement in the more advanced cases of extensive choroido-retinal atrophy.

It will be interesting to receive further reports.

H. B. STALLARD.

(19) **Pfeiffer, Raymond L. (New York).—Hypersensivity to pontocaine).** *Arch. of Ophthal.*, July, 1937.

(19) Pontocaine, formerly called pantocaine, is being used extensively in ophthalmology as a local anaesthetic in strength of 0·5-2 per cent. It is usually harmless, but occasionally patients are found who are hypersensitive to it. **Pfeiffer's** case was that of a man, aged 28 years, with a retinal detachment, who had an instillation of two drops of 0·5 per cent. pontocaine into each eye prior to

tonometry. Next day there was massive oedema of the eyelids, face and parotid regions with diffuse chemosis and conjunctival congestion. Much sloughing of the conjunctiva occurred on the second and third days, and the oedema remained until the 12th day, at which time it was noted that the retina had become re-attached. A patch test on the skin of the arm, showed erythema after 6 hours, vesicles after 12 hours and sloughing of the epidermis next day.

F. A. W-N.

(20) **Russo (Bari).—A neuro-epithelioma of the retina with unusual clinical features. (Neuro-epitelioma della retina a quadro eccezionale).** *Boll. d'Ocul.*, September, 1937.

(20) This case was a boy, aged nine years, who had suffered three years before from a traumatic subluxation of the right lens. Nothing seems to have been noted abnormal in the fundus at that time. On this occasion, he was brought to the clinic because "his eye was full of blood." The tension was below normal; the fundus could not be seen. Vision was abolished. After treatment the blood was absorbed from the anterior chamber and the eye became white; he was discharged but in a few days was back with fresh haemorrhage and pain. As the eye was useless and painful it was removed.

Being examined in routine, a small tumour was found in the detached retina. This was carefully examined and proved to be derived from a multiplication of the neural epithelium which by its increase throws the surface into pits and folds. This change may be easily seen at the region where the tumour becomes continuous with the normal retina. No glial elements had part in the production of the neoplasm; the term, glioma, should therefore be abandoned in favour of the term neuro-epithelioma, in tumours of this nature.

HAROLD GRIMSDALE.

(21) **v. Rotth, H. (Budapest).—Ocular conditions in twins. (Ueber Augenbefund von Zwillingen).** *Klin. Monatsbl. f. Augenheilk.*, Vol. XCVIII, p. 636, 1937.

(21) **v. Rotth** examined the eyes of 43 pairs of uniovular twins and of 49 binovular twins of the same sex. and five of uncertain identity. He could find no ophthalmological characteristic which could be used to assist identification. Uniovular twins show a closer similarity than binovular twins, in such features as colour and shape of eyebrows, lids, iris and optic nerve, *i.e.*, in structures of ectodermal origin. His figures for the differences in refraction of the eyes are a little higher than those in the literature:—total refraction 2·75 dioptres, corneal refraction 1·5 and corneal astigmatism 2·0, being the maximum figures for uniovular twins. There

were very slight differences in intra-ocular pressure or in muscle balance. Among the few pathological conditions observed in uniovular twins were, a case of high degree of corneal astigmatism and a defective colour vision occurring in both twins, and opaque nerve fibres in one eye of one twin only.

D. R. CAMPBELL.

(22) **Denti (Milan).—Localisation of foreign bodies, opaque to X-rays in the eyes. (Sulla localizazione di corpi estranei endobulbari X-opachi).** *Rass. Ital. d'Ottal.*, March, 1937.

(22) **Denti** is chiefly interested in the possibility of indicating the exact limits of the posterior half of the globe and so to determine the position of a foreign body, when it lies in the posterior part of the vitreous. To this end he advises the use of injections of either thorotrast or neoidipin into Tenon's capsule. He has found that both these substances give rise to no inconvenience and are well tolerated by the subject, and at the same time give a clear picture of the posterior outline of the eye. He thinks that these injections give a method of localising foreign bodies better than any other, though even with their help an exact diagnosis is very difficult when the object lies far back. He hopes that with further experiment and improvement of the method even better results may be obtained.

HAROLD GRIMSDALE.

(23) **Mossa (Cagliari).—The origin of choroidal colobomata. (Sulla genesi dei colobomi coroideali).** *Rass. Ital. d'Ottal.*, March, 1937.

(23) **Mossa** gives two pedigrees of three cases of coloboma of the choroid which have come under his observation. In the first, a brother and sister showed a coloboma in the left eye; the maternal grandmother is said to have had bilateral colobomata. In the second pedigree, the patient had a coloboma of the right eye, and had an aunt, sister of his mother, who was affected. The author concludes that in these cases the cause is imperfect development—such defects are known to be not infrequently hereditary. He gives account of two other forms of colobomata; in one case which he describes, there were numerous patches of disseminated choroiditis, with one so large as to merit the name of a coloboma: there seems no reason to doubt the inflammatory origin of this. The third form, which he quotes, with personal observation, was described by Johnson, as having a lobulated form and intense pigmentation. The author's case showed a deeply pigmented area with three lobes; the vision was much reduced. He thinks that these form a third group, neither developmental nor inflammatory in origin, but taking origin from a naevoid state of the choroid.

HAROLD GRIMSDALE.

(24) **Brecher, I. (Radautzi).—On the active treatment of gonococcal conjunctivitis with a steam spray. (Zur wirksamen Behandlung der Ophthalmoblenorrhöe durch Anwendung der Dampf-Spray-Hyperthermie).** *Klin. Monatsbl. f. Augenheilk.*, Vol. XCIX, p. 301, 1937.

(24) **Brecher** describes a new thermal treatment of gonococcal conjunctivitis which gave very good results in five adult cases and thirteen cases of ophthalmia neonatorum. He found that the pus formation was much less on the third day of treatment. His usual procedure was to irrigate with 1:4000 permanganate solution and instil 1/100 adrenalin to smooth out the recesses in the conjunctiva. The eye was protected by a non-irritant silver ointment (2 per cent. Argolavalsalbe). A jet of steam was then held 10-12 c.m. from the eye and allowed to act for 10-15 minutes, the effective temperature in the region of the eye being constant at 42°, which is lethal to the gonococcus. The treatment was repeated 3-4 times a day, being gradually lessened as the discharge ceased.

D. R. CAMPBELL.

BOOK NOTICES

Dekking's Atlas of Diseases of the Eye. No. 1. Colour photographs 1 to 10. MARTIN NIJHOFF. The Hague. 1937. Price, Guilders 3.60. (1 Gld.=2/3)

Dekking's Atlas of Diseases of the Eye will consist of 50 colour photographs in five portfolios of ten each, accompanied by short legends in English, French and German. The photographs have a magnification of three and illustrate both common and rare diseases of the anterior segment of the eye. They have been admirably reproduced and will be invaluable for lecturers and clinical teachers of ophthalmology. The colour photographs are on separate sheets to facilitate projection by an epidiascope. The prints are clear and possess very natural and realistic qualities.

The first portfolio is now available and it is hoped that the remainder will be published in a few months.

Anaglyphs (their use in orthoptic training). By MARGARET DOBSON. Anaglyphs 10. Pp. 41. London: C. Tinling & Co., Ltd. Price, 21s.

The author states that the muscle balance at the near point (*i.e.*, 33 cms.) is the difference between the heterophoria at distance and near and must be adjusted by means of fusional convergence or duction, the measure of fusional reserve. In this book she sets

out to show that the object of the training with anaglyphs is to increase the amplitude of fusional reserve, and to bring about convergence innervation or relaxation both at distance and at the near point. Miss Dobson claims that the training is of value in cases of squint when first grade fusion has been obtained, in heterophoria and cases in which binocular discomfort is accounted for by insufficiency of fusional amplitude for the particular needs of the patient.

Chapters are devoted to a description of stereoscopic vision, anaglyphs and the stereoscope in connection with anaglyphs, the use of anaglyphs in orthoptic training and photographic and training anaglyphs.

The description of the diagnostic value of anaglyphs in cases of squint and heterophoria is interesting.

Stereoskopische Bilder für schielende Kinder. By PROFESSOR C. H. SATTLER. Third Edition. Stuttgart: Ferdinand Enke. 1937. Price RM. 6.10.

The third edition contains 54 double sets of stereoscopic pictures drawn in black and white on cards 7·5 x 5 mm. The pictures are designed for simultaneous macular perception, fusion and stereoscopic vision, the components of each drawing fitting in to make a composite picture when both are viewed through a stereoscope. A black card 15·5 x 7·5 mm. is fitted along its lower edge with a tape on which is marked a millimetre scale. The tape also serves for the retention of the cards and it is possible to move these apart or to approximate them in this simple device.

With these cards and their container stereoscopic exercises could be undertaken cheaply in the patient's home without the need for expensive apparatus.

A booklet containing instructions and an explanation of the 54 drawings accompanies the set of cards.

On Deficiency of A Vitamin and Visual Dysaptation: II. By C. EDMUND and SV. CLEMMESEN. Copenhagen: Levin and Munksgaard. London: Humphrey Milford (Oxford University Press). Price, 3/6.

This brochure of 52 pages amplifies a previous pamphlet with the same name which was reviewed in our columns in 1936, p. 695.

The following is the author's summary:—

"The previously described normal zone and normal curve are discussed on the basis of subsequent tests performed with the help of special standardised types.

"It is demonstrated that the number of cases of dysaptation in pregnant medical patients has decreased during the last twelve

months, probably owing to the vitamin agitation raised by the press and to the vitaminisation of the margarine.

" The effect of parenteral administration of carotin oil proves to be slower than that of injection of liver oil preparations. A series of extensive investigations of the power of distinction is accounted for, the test subjects being 28 prisoners of the State prison in Nyborg. The power of distinction is tested regularly throughout a period of nine months. One group of prisoners evidently presented seasonal oscillations in the power of distinction, which failed to appear in a control group of prisoners who received the same diet with a supplement of milk."

CORRESPONDENCE

TUBERCULIN IN TREATMENT OF TRACHOMATOUS KERATITIS

To the Editors of THE BRITISH JOURNAL OF OPHTHALMOLOGY.

SIRS,—May I ask if you can grant the space for the following brief account on the subject of the title:—My object is to draw attention to a new field in which tuberculin proved to play an important part, namely, the treatment of trachomatous manifestations in the cornea. These are, briefly, infiltrations (superficial and deep), pannus and ulcers. The fact that severe trachoma of the conjunctiva sometimes occurs without apparent change in the cornea has often struck me. On the other hand, one often sees cases of severe trachomatous keratitis of the recurrent type with only mild trachomatous conjunctivitis. The usual treatment of such cases up till the present has been to treat energetically the condition of the conjunctiva and apply atropine ointment, which in many cases ended in failure. This led me to the belief that trachomatous keratitis was only a manifestation of a specific disease. Having successfully treated and cured many obstinate cases with tuberculin alone (without any local applications), I came to the conclusion that the specific disease was latent tuberculosis, the foci of which remained quiescent and inactive, at least temporarily, but could be activated by exposure to unfavourable conditions, *e.g.*, illness, extensive re-infection and exhaustion. The presence of these latent foci is demonstrable with any of the tuberculin tests as mentioned in most text books on bacteriology. Having obtained a positive reaction one proceeds to give tuberculin subcutaneously twice weekly at first and once weekly later, starting always with minute

doses; the fundamental rule is never to provoke a febrile reaction of any importance. Personally I begin with 1/2000 mg. and increase gradually to 1/10 mg. which I continue giving once a week for a long time (over a year). Lately I have been injecting tuberculin in the lids deep in the submuscular layer with very favourable results. Here I begin with 1/10,000 mg. and add 1/10,000 mg. to each subsequent dose. This method gives much quicker effect and enables one to observe the reaction objectively, the amount of swelling of the lid being an estimate of the toxicity of the given dose. The proper dose should only produce a mild fleeting swelling. To guard against mixed infection during this treatment, I give the patient 2 per cent. mercurochrome drops to instil at home.

Results of Treatment.—Lacrymation stops, photophobia disappears and vision improves appreciably before the second injection. Objective signs take longer to disappear, and the rate of progress differs in the different cases. A case of mine had severe pannus with total infiltration of the left cornea and vision, when I fist saw her (October 10), was C.F. at 50 cm. On October 17, under tuberculin treatment alone, vision improved to C.F. at 1 m., on the 20th L.V.=4/60, on the 30th 6/60 and on the first day of November 6/36. Another case had fleshy pannus in the upper part of the cornea with punctate ulcers which had been recurring for three months. I saw her first on April 27, the ulcers healed after the first injection and the thick fleshy pannus disappeared entirely to the naked eye on July 10.

The condition of the lid improved along with that of the cornea, so that there was no need to apply any medicine locally, far less to interfere surgically. Indeed I have found that local interference would retard the progress.

Among other conditions I have successfully treated with tuberculin were multiple styes, chronic blepharitis, phlyctenular keratoconjunctivitis and especially deep infiltrations of the cornea of obscure nature. Two of my cases had their left corneae entirely opaque as a result of curious deep infiltrations which resisted all sorts of treatment for three months. On tuberculin treatment alone, the opacity in each got gradually lighter and finally disappeared. This took one month in one case and 39 days in the other. There were no signs of iridocyclitis.

Your obedient servant,

M. A. L. HASSOUNA, D.O.M.S.,
Tutor of Govt. O.H. Rodel Farag.

PONT DE KUBBA,
CAIRO.
December 5, 1937.

OBITUARY

SIR JOSIAH COURT

Sir Josiah Court died at his home, Staveley, Chesterfield, on February 8, at the great age of 97. He was born in January, 1841, and was educated at Warwick Grammar School and Guy's Hospital; qualifying M.R.C.S.Eng. in 1863, he took the L.R.C.P.Lond. in the year following and after holding house office at Guy's, he went into practice in Derbyshire.

He was a pioneer in cases of miners' nystagmus and was largely responsible for calling public attention to poor lighting in the mines as a cause. As far back as 1891 he was the author of a "Report of the examination of the eyes of coal-miners in Derbyshire, Durham, Forest of Dean and Belgium." For many years he was consulting surgeon for compensation cases to the Derbyshire Miners' Union and surgeon to the Great Central Railway works at Staveley. A J.P. for the county, he was an unsuccessful candidate for the N.E. Division of Derbyshire in Parliament.

The mining industry owes much to Sir Josiah, and he was a good example of the vast amount of good that an all-round man in general practice can do in matters which border on specialism with which he comes in contact in the ordinary routine of his daily work.

NOTES

Honour

THE Parkes Memorial Prize, 1937, has been awarded to Major J. Biggam, M.C., for his investigations into the lighting of barracks and for other ophthalmic work for the Army.

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Deaths

WE regret to record the death of Ernest Charles Arnold, of Forest Hill, on February 10, 1938. The son of the Rev. C. M. Arnold, Vicar of St. Mark's, S. Norwood, he was born March 25, 1860. He was educated at Westminster and St. George's Hospital. Qualifying M.R.C.S. in 1884, he was house surgeon at St. George's and after a period of post-graduate study in Berlin and Vienna he took the M.B. Dunelm in 1886 and the F.R.C.S.Eng. in 1888.

For a time he was in practice in Swindon and was surgeon to the local hospital; but most of his professional life was spent in Forest Hill. For some years he was Refraction officer at the Royal Eye Hospital and he also worked in a similar capacity at Moorfields. During the War he served as Temporary Captain R.A.M.C.

The death of Sir James Crichton-Browne should not pass unnoticed in the Journal for it was at the West Riding Asylum, during his superintendentship, that so much of the early research work on neurology was done by Ferrier and Hughlings Jackson. Allbutt, also, received his help in some of his early investigations on cerebral syphilis. Sir James was one of the founders of *Brain* and for a time was part Editor of that journal. He maintained his wonderful vitality until almost the end of his long life, and his Dundreary whiskers were famous as the last survival of these appendages.

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University of Glasgow Department of Ophthalmology

A COURSE of lectures on The Treatment of Eye Diseases will be given on the following dates:—Tuesday, April 5, Dr. I. Chesar Michaelson, squint and other defects of muscle balance. Tuesday, April 12, Dr. J. Burdon-Cooper (Bath), the non-surgical treatment of cataract. (Dr. Burdon-Cooper has been engaged on research into the chemistry of the normal and cataractous lens, and his lecture will deal with the bearing of this investigation on the treatment of cataract.) The lectures will be given at 4.30 p.m. in the Tennent Memorial Building, Church Street. All interested are cordially invited.

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Cours de Perfectionnement, 1938

PROFESSOR TERRIEN announces that the annual Cours of Perfectionnement will be held at the ophthalmological clinic of the Hôtel-Dieu from May 20 to June 24, 1938. A very complete programme has been prepared, copies of which, together with other details as to cost, can be obtained from Professor Terrien.

FUTURE ARRANGEMENTS

1938

April 1.—North of England Ophthalmological Society, at Sheffield.
April 8.—Midland Ophthalmological Society, at Nottingham Eye Infirmary.
April 28-30.—Ophthalmological Society of the United Kingdom, in London.
May 27.—Midland Ophthalmological Society, at Cheltenham Eye Hospital.
June 10.—Section of Ophthalmology, Royal Society of Medicine (Annual Meeting).
July 7-9.—Oxford Ophthalmological Congress, at Oxford.
October 7.—Midland Ophthalmological Society, at Birmingham and Midland Eye Hospital (Annual Meeting).

CONTEMPORARY OPHTHALMIC LITERATURE

American Journal of Ophthalmology. *February, 1938.*

BEACH and MCADAMS. Benzedrine in cycloplegia.
DASHEVSKY and BOOSHMITCH. Optical decentration of the eye.
MCKEE and MCNAUGHTON. Neuromyelitis optica
LAMB. Uveal infiltration in endophthalmitis.
DAVIS. Treatment of the phorias.
MARTIN. Maximum convergence.
BARKAN and BETTMAN. So-called dinitrophenol cataracts.
RANDOLPH. Unilateral exophthalmos.
KRAVITZ. Treatment of ocular syphilis.
WATROUS and OLMSTED. Central tenotomy.
JOHNSTON. Colon-bacillus conjunctivitis.

Archives d'Ophtalmologie. *December, 1937.*

SHOJI. Clinical features and pathogenesis of black or brown cataract.
CHARAMIS. Marfan's syndrome.
JAYLE and DERRIEN. Contribution to the comparative study of the composition of the aqueous humour and of the blood plasma in men and in dogs.

Archiv für Ophthalmologie. *February, 1938.*

GREEFF. What portraits do we possess of Albrecht von Graefe? (2) His image in systematic chronological order.
SCHUTZBACH. Choroido-retinal disease.
SOHR. The question of the production of dinitrophenol cataract in animal experiments.
KARBOWSKI. Symptomatology of coloured vision.
SASAKI. Examination of the lens, the blood and the aqueous of rats with galactose fatty degeneration. (1) Clinical observations of a galactose cataract.
SASAKI. Examination of the lens, the blood and the aqueous of rats with galactose fatty degeneration. (2) The lens capsule permeability and the sugar content of the blood, aqueous and lens in galactose cataract.
SASAKI. Examination of the lens, the blood and the aqueous of rats with galactose fatty degeneration. (3) The ability of the nutrient fluid of vitamin C to protect the galactose cataractous lens from oxydation.
PURTSCHER and WENDLBERGER. Naevus of the upper lid in Bourneville-Pringle's disease.
SUGITA. Colloid chemistry of the different parts of the eye, especially the difference between the clear and the dark retina.
SUGITA, Y. and SUGITA, S. The difference of the histo-chemical reactions in the various parts of the lens.
de'CORI. Research about the efficacy of vitamin C on totally extracted mature cataractous human lenses.
SALLMANN. A further contribution to the anatomy of Gunn's and Salus' signs.
FAZAKAS. Hyphomycetes of healthy and diseased eyes.
KOKOTT. The mechano-functional structure of the eyes.
WAGNER. Pathological and therapeutic efficacy of penetrating ultra-red rays on the eyes.

Klinische Monatsblätter für Augenheilkunde. *January, 1938.*

KOKOTT. An experimental contribution to the question of the natural healing of the eyes: the eye before, during, and after a month's fasting cure.
STROMBURG. Constitutional treatment of ocular tuberculosis.

WEGNER. The operative treatment of trochlear destruction.
HEYMANN. Protrusio bulbi from parotic carcinoma with metastases in the base of the skull.
SAUTTER. Contribution to the study of the inflammatory pseudo-tumours of the orbit particularly two cases of monocular exophthalmos.
KREUZEDER. Pallor and atrophy of the optic nerve with inflammatory and degenerative retinal changes, with disturbance of the pyramid and co-ordination tracts in infancy in a uniovular pair of twins.
KUKAN. Occlusion of the filtration angle through negative pressure.

Zeitschrift für Augenheilkunde. *December, 1937.*

SAFAR. Retinal detachment with holes at the posterior pole cured through diathermy punctures.
KREIBIG. Carcinoma metastases in the eyes.
PANTASATOS. Necrosis in sympathetic infiltration and about periphlebitis retinalis sympathicans.

January, 1938.

FISCHER. Malformation of the lacrymal passages and their recovery of form.
PURTSCHER. Aetiology of spontaneous choroidal detachment and serous Tenonitis.
CSAPODY. New experience with plastic reconstruction of the socket.

Archivio di Ottalmologia. *November, 1937.*

BOSSALINO. Three observations of anterior sclero-uveitis of which two became malignant (scleroperikeratitis progressiva of von Szily) and one of these bilateral. (Clinical, histopathological and bacterial notes on three enucleated eyes.)

Bollettino d'Oculistica. *December, 1937.*

BIETTI. Some atypical and rare forms of retinal degeneration.
MOTOLESE. The pathogenic action of the bacillus pyocyaneus on the ocular tissues of the rabbit.
MATTIUCCI. Unilateral exophthalmos from neoplasm of the medial cranial fossa. (Cholesteatoma of the greater wing of the sphenoid.)

Archivos de Oftalmologia de Buenos Aires. *November, 1937.*

DEMARIA. Trachoma in the province of Santa Fe, especially in the department of Gral. Obligado.
ORTIZ and IMBERN. Contribution to the cause of lacrymal disease.
ZAVALIA. Prophylaxis for purulent conjunctivitis of the newly born.
COTHER. Treatment of bilateral blepharo-clonus by psycho-motor re-education.
GIQUEAUX Retro-ocular hydatid cysts.
ONETO, GALLINO and NATALE. Rapid development of cataract in both eyes in consequence of treatment with dinitrophenol for slimming.
MALBRÁN and ADROGUÉ. Excessive divergence.
PAVIA. Vitreous humour, its enclosure in the eye and deposits on the hyaloid membrane in both eyes.
DAMEL and FORTIN. The retinal vessels of the bat.
ADROGUÉ and RECA. Leber's hereditary optic atrophy.
PAVIA and TARTARI. Circumscribed multiple tears of the retina.
DAMEL and ONETO. Corneo-conjunctival dermoid.
ORTIZ. Acute post-traumatic conjunctivitis: considerations of the medico-legal aspect.